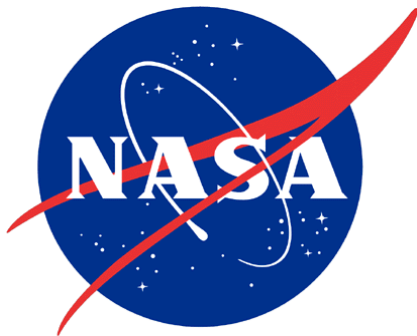

Workbook 15: Using the Huntsville Operations Support Center (HOSC) End-User Command Applications

HOSC Training Division

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Space Administration

George C. Marshall Space Flight Center
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Workbook 15:
Using the Huntsville Operations Support Center (HOSC)
End-User Command Applications

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Mission Operations Laboratory
Science and Engineering Directorate
Marshall Space Flight Center



Welcome

Welcome to Huntsville Operations Support Center (HOSC) training provided by the HOSC Training Team (HTT).

If you are interested in scheduling additional training, submit a training request form via the Internet. The homepage can be accessed at:

http://mole.msfc.nasa.gov/hosc_training/htt.html

Another option is to contact the HOSC Training Coordinator, Dawn Schell, at (256) 461-4927.

Training Contacts

If you have questions regarding training, contact your EO62 training representative or one of the following individuals:

Name	Organization	Phone Number	E-mail Address
Lisa Watson	EO39	544-3523	lisa.watson@msfc.nasa.gov
Kim Lankford, HTT Lead	NTI	461-4536	kim.lankford@ums.msfc.nasa.gov
D.C. (Sparky) Goodman	NTI	461-4545	sparky.goodman@ums.msfc.nasa.gov
Michelle Adrian	NTI	461-4514	michelle.adrian@ums.msfc.nasa.gov
Dawn Schell	NTI	461-4927	dawn.schell@ums.msfc.nasa.gov
Gene Sobczynski	NTI	461-4516	eugene.sobczynski@ums.msfc.nasa.gov
James (Jay) Washburn	NTI	461-4543	james.washburn@ums.msfc.nasa.gov
Anthony (Mac) McCoy	bd Systems	461-4532	anthony.mccoy@ums.msfc.nasa.gov

Workbook Overview

The majority of the workbooks are designed to be self-paced requiring very little assistance from an instructor. The following table lists the workbooks and their associated course number:

Workbook Numbering System

Workbook Number	Title	Associated Course
Workbook 1	HOSC End-User Software Training	HOSC-1000 HOSC-1010 HOSC-1020 HOSC-1030
Workbook 2	Using the Databases	HOSC-2050
Workbook 3	Using the Exception Monitor Application	HOSC-2060
Workbook 4	Using the Display Generation and Operation Applications	HOSC-2070
Workbook 5	Using the Computation Generation and Operation Applications	HOSC-2080
Workbook 6	Using the Scripting Applications	HOSC-2090

Workbook Numbering System (Continued)

Workbook Number	Title	Associated Course
Workbook 7	Using the NRT Data Request Applications	HOSC-2100
Workbook 8	Using Applix	HOSC-2110
Workbook 9	Using FrameMaker	HOSC-2130
Workbook 10	Using Electronic Mail	HOSC-2140
Workbook 11	Using the Payload Information Management System (PIMS)	HOSC-2150 HOSC-2160
Workbook 12	Using the Pixmap Editor	HOSC-2170
Workbook 13	Using the Ground Support Equipment Packets Application	HOSC-2180
Workbook 15	Using the End-User Command Applications	HOSC-2120
Workbook 22	Workstation Overview and General Purpose Utilities Training	HOSC-1040
Privileged Applications		
Workbook 16	Using the Privileges within the Database Applications	HOSC-3000
Workbook 17	Using the Command System Management Application	HOSC-3010
Workbook 18	Using the User Configuration Management Application	HOSC-3020
Workbook 19	Using the System Monitor and Control Applications	HOSC-3030 HOSC-3040
Workbook 20	Using the Data Packet Generator Application	HOSC-3050
Workbook 21	Using the Database Monitor and Control Application	HOSC-3060

This workbook covers course:

HOSC-2120 - Using the End-User Command Applications

This course will provide the trainee with the information necessary to operate the End-User Command Application software and the Command Utilities software.

Workbook Layout

The workbooks include a welcome section that details how the document is divided into modules as well as what is contained within each module. The modules include a discussion of the main topic of the module, a step-by-step “Try It...” and review questions. Modules have been included that “put it all together” and provide exercises to reinforce what you have learned.

This workbook is unique in that it describes two of the command applications provided by the Enhanced HOSC Software. A brief description of each application, terms and definitions peculiar to the discipline, and a discussion of the operational concepts are provided followed by a scenario which describes how someone might use the application. You are provided an opportunity to use each application in a step-by-step “Try It...”. Additional exercises are provided which require that you delve into the nuances of the application. Research questions are provided at the end of each module that require you to study the user guides and other documentation to enhance your application knowledge.

These particular applications are provided to assist you, the user, in accessing and manipulating the End-User Command Application software and the Command Utilities software. This course will provide a thorough introduction to the purpose and structure of the software and will set you on a path toward understanding the applications and mastering the manipulation of them.

This workbook and the accompanying course is divided into six modules. The first module discusses basic definitions and concepts peculiar to the End-User Command applications. The next two modules discuss, in depth, Command Update Form Generation and Command Operation. Command Utilities software applications are discussed in the following two modules and the workbook concludes with a module that consolidates all of the previously discussed material into a cohesive whole.

Each module features an exercise which will apply the skills you acquire during the course. The six modules include:

- Module 1: *Definitions and Concepts*
- Module 2: *Command Update Form Generation*
- Module 3: *Command Operation*
- Module 4: *Command Delog*
- Module 5: *Command History*
- Module 6: *Tying It All Together*

Given the extensive technical requirements, extreme effort has been taken to make the software as intuitive and user-friendly as possible. Hopefully, your experience with the software will be rewarding, and you’ll find it satisfies your individual needs.

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Module 1

Definitions and Concepts

Objectives

In order to access and work within the command applications of the EHS a fundamental understanding of terms, definitions, and concepts as used in the EHS is necessary. Information presented in this initial module is intrinsic to your understanding of the commanding applications as it forms the building blocks of which the End-User Command Applications are built. In this module you will learn:

- the terms and definitions associated with the End-User Command applications
- command overview, command architecture, and command applications concepts

Definitions

Though commands are a form of telemetry, they are very specialized in nature, having a unique set of terms, concepts, and nomenclature that should be learned prior to working with the End-User Command applications.

Relational Database

All of the databases used in the EHS are based on the “relational” database model and consists of a set of tables peculiar to that particular database. In a relational database, the objects, or “things”, about which data are kept are called entities. Each table in the database contains data about a single type of entity. Some of the tables contain information about data characteristics. Other tables are used to “look up” valid values for a particular type of data. Still other tables contain data about the relationship between the entities that are represented by the other tables. Regardless of whether the table contains data about characteristics, look-up values, or relationships, all of the data for each occurrence of the entity represented by the table is located in a single row of the table.

Command Database

The Command Database (CDB) provides the capability to access and manipulate data in an EHS project command database (PCDB) which contains the command definitions needed to drive HOSC command processing. The Command Database provides a predefined script which defines the format of each of the tables in the Operational Command Database (OCDB). A process provided by the Command Database retrieves data from the baselined PCDB, including the non-configuration controlled command data set and modifiable command chain definitions, and populates the specified OCDB tables.

The Command Database application provides you with the means to create a user copy of commands you are authorized to access so that you can modify their contents, perform certain validation checks, and submit proposed database changes to the Database Coordination Group (DBCg).

Operational Command Database

The Operational Command Database (OCDB) resides on the command server and is part of the Command Subsystem available only during an operational support mode. Before a mission support activity the PCDB is used to create a unique OCDB. The OCDB contains the command data set and command chain definitions, and the uplink patterns for all pre-defined and complete modifiable commands.

User-Generated Data Element Database

The User-Generated Data Element (UDE) Database provides for centralized storage of data elements developed by other EHS applications. These data elements can include displays, computations, scripts, command update forms, local table change files, Near Real Time data requests, exception monitoring configuration files, message handler configuration files, or strip chart recorder configuration files. A separate UDE database is maintained for each project and mission.

UDEs are console tools on the workstation that enable a user to analyze telemetry and generate commands. The EHS applications enable users to generate and operate a UDE, and users have the capability to run multiple applications and windows simultaneously. Most UDEs which process telemetry or commands are required to be validated prior to operation which ensures that the user has correctly generated the UDE. A user may save his/her UDE on the workstation or store the UDE on the database central server. Storing a UDE in the UDE database provides the means for users to share the files. A UDE marked as shareable in the central database can be downloaded to another user's workstation.

Command

A complete, defined sequence of data (including the command header and command body) which communicates information from a source, either ground or flight-system based, to a payload or spacecraft destination.

Command Body

The portion of the command defined in the Command Database which is used as the transmission vehicle for conveying command data field definitions from the command's source to the command's end-item destination.

Master Command

A command used as a shell or template to be copied, with the exception of overridden fields, to create other commands.

Command Data Field

An element within a command body containing a single data value. Databased attributes associated with a command data field include its field mnemonic, its type (modifiable verses predefined), its initial value, its input data type, its uplink data type, and the fields length.

Command Header

The portion of the command defined in the Command Database (CDB) which contains the information vital to proper routing of the command body to the appropriate destination.

Command Header Data Field

An element within a command header containing a single data value. Databased attributes associated with a command header data field include its field mnemonic, its type (modifiable verses predefined), its initial value, its input data type, its uplink data type, and the fields length.

Command Mnemonic

A reference used to issue a command that uniquely identifies a command within the command database.

Command Response

Information indicating the status of a command as it progresses to its destination.

Input Data Type

The data format in which a user supplies data to command data fields within the Command Database. Prior to uplink, data in each command data field is converted from its input data type to its corresponding uplink data type. The input-to-uplink data conversion mechanism performed by the Command Database simplifies the modifiable data entry process on behalf of the users. When supplying data for a data field, you provide it in a user-friendly, recognizable, readable format (the input data type). The Command Database then decalibrates and converts it into a more complex format that is uplinked to the spacecraft (the uplink data type).

Modifiable Command

A command that is defined in the Command Database containing at least one modifiable command data field that may be updated by a user at any time prior to or during a mission.

Predefined Command

A command that is completely defined in the Command Database prior to a mission. Predefined commands contain no modifiable data fields.

Uplink Data Type

The data format in which the data for each command data field is transmitted to the command's destination. Prior to uplink, data in each command data field is converted from its input data type to its corresponding uplink data type.

Command Structure

The HOSC command format concept recommends that each command consist of one database-defined command header followed by a separately defined command body. Both the header and the body are comprised of one or more command data fields. All command data fields are individually defined in the delivered Command Database in terms of field length, field input and uplink data types, the field's starting location in a command word, and whether the field data content is predefined or modifiable. The basic command structure is depicted in Figure 1-1. Command Format Structure.

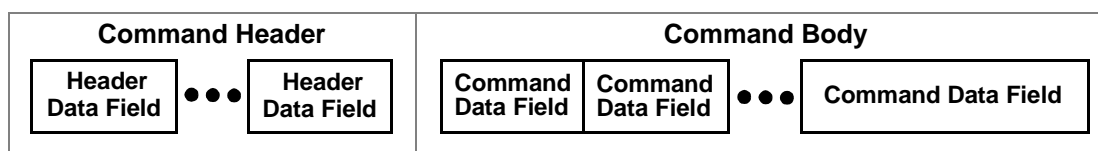


Figure 1-1. Command Format Structure

Command Header

A header consists of one or more header data fields and is referenced in the Command Database by a unique header mnemonic. Each header data field within the header is identified by a field mnemonic, has an individually defined fixed length, and is defined as either predefined or modifiable. Only fixed length command header data fields are allowed.

A header provides onboard routing and destination information for the command once it has been received by the intended spacecraft. A single header definition in the Command Database can have many command body definitions associated with it.

Command Body

A command body is composed of one or more command data fields and is referenced in the Command Database by a unique command mnemonic. Like the header data field, a command data field is identified by a field mnemonic and is defined as either predefined or modifiable. If a command is of fixed length, then each field within the command will have an individually defined fixed length. If the command is of variable length, in addition to any fixed length fields, only one field within the command's definition, the last field, will have an undefined, variable length at the time of command definition. The field's data contents are provided through user input prior to the command's uplink. The field's length is derived from the length of the user input data. Any individual command body definition has only one header definition designated for use during construction of the command's uplinkable bit pattern.

Command Types

The Command Database defines command header structures and command body structures. Each of these structures can be classified as either predefined or modifiable. Modifiable commands may be further sub-classified as fixed length or variable length modifiable commands.

Predefined Fixed Length Command Headers

Predefined command headers are those header formats in which all data used to define the header is delivered with the Command Database and cannot be modified in real-time by the user. The definition of a predefined command header includes, at a minimum, a header mnemonic, one or more predefined fields from which the header is constructed, the predefined data for each field, and the length of each field.

The header length is defined as the summation of the lengths of all header fields and is a fixed or constant value. Because the user cannot change the length of any of the fields in a predefined, fixed length header, the total length of the header is also fixed.

Modifiable Fixed Length Command Headers

Modifiable command headers are those header formats in which one or more fields within the header are modifiable in real-time by the user. The definition of a modifiable command header includes, at a minimum, a header mnemonic, one or more modifiable fields, and the length of each field.

The header length is defined as the summation of the lengths of all header fields, both predefined and modifiable. Because the user cannot change the length of any of the fields in a modifiable, fixed length header, the total length of the header is also fixed. Modifiable, variable length headers are not allowed.

In addition to modifiable fields, modifiable command headers may also include one or more predefined fields. Initial values for modifiable fields in the header may be delivered with the Command Database. Users may update modifiable fields with data that is in the input data type defined for that field. It is

important to note that a modifiable field indicates that the user may change the value of the data within the field, but not the length of the field.

Predefined Fixed Length Commands

Predefined commands are those command formats in which all data used to define the command body is delivered with the Command Database and cannot be modified by the user. The definition of a predefined command includes, at a minimum, a command mnemonic, one or more predefined fields from which the command is constructed, the predefined data for each field, and the length of each field. Predefined commands may only be of fixed length type.

The command body length describes the total length of the command body as defined as the summation of the lengths of all fields within the command body. The length of a predefined command is a fixed or constant value. Because the length of none of the fields in a predefined command can be changed by the user, the length of a predefined, fixed length command is also fixed.

Modifiable Fixed and Variable Length Commands

Modifiable commands are those command formats in which one or more fields within the command body are modifiable by the user. The definition of a modifiable command includes, at a minimum, a command mnemonic, one or more modifiable fields, and the length of each field. In addition to modifiable fields, modifiable commands may also include one or more predefined fields. Initial values for modifiable fields in the command body may be delivered with the Command Database. Users may update modifiable fields with data that is in the input type defined for that field. Modifiable commands may be either of fixed length type, in which the user cannot change the command's total length, or of variable length type, in which the user can dynamically set the command's total length through the modification of the command's variable length field.

Modifiable Fixed Length Commands

The length of most modifiable commands is a fixed, or constant, value. This length describes the total length of the command body as defined by the concatenation of all fields within the command body, both predefined and modifiable. Because the user cannot change the length of any of the fields in a modifiable, fixed length command, the total length of the command body is also fixed.

Modifiable Variable Length Commands

This special type of modifiable command contains a single, modifiable field which has the unique distinction of having a variable length. The variable length field must be the last field in the command body definition. Modifiable, variable length commands may contain only one variable length field. The length of a variable length field may be between one and four bytes long. The total length of a variable length command is not defined in the database until after the variable length field data is sized and defined by the user. Users may update a variable length command with data, provided that the data is supplied to the database in the hexadecimal input data type. The final length of the command will be

determined using the summation of the length of the uplink data provided by the user in the variable length field and the length of all other fields comprising the command's uplink pattern.

Command Update Forms

Modifiable command data that is maintained in the OCDB is available to users through command update forms. With command update forms, users are able to view and, if applicable, update data contained in the modifiable fields of commands which they are authorized to access.

User-generated Forms

User-generated update forms provide a way for users to not only see the data in their modifiable, project-defined commands, but to individually customize, on a command-by-command basis, the format in which the data will be displayed.

System-provided Forms

System-provided command update forms are fixed-format forms which allow a user to view and change the uplink data in the single modifiable field of variable-length, variable-format (VV) type commands, but does not allow the user the freedom of display customization.

Command Designations

Commands within the EHS may be designated as hazardous, critical, both hazardous and critical, or innocuous (neither hazardous nor critical). Command processing for hazardous/critical commands is similar to innocuous command processing, but uses additional safeguards to ensure that inadvertent uplinks of hazardous or critical commands do not occur.

Innocuous Commands

Innocuous commands are those commands that are determined by a project to be neither hazardous nor critical. The uplink and subsequent execution of innocuous commands will not in any way cause harm to the spacecraft or its personnel, nor will it cause any irreparable damage to a payload or the mission.

Critical Commands

A critical command is defined as a command whose initiation and execution could possibly cause damage to a payload or spacecraft and impair the mission.

Hazardous Commands

A hazardous command is defined as a command whose initiation and execution could pose a threat to human life or the entire mission.

Command Uplink Methods

Command subsystem users are able to uplink commands using the Command Operation application. The specific type of uplink command processing performed by the Command subsystem depends on the method chosen to uplink a command. Depending on specific project requirements, commands may be uplinked individually, in a sequenced command group (formally known as “on-line” command loads), or in a command load.

Individual Commands

An individual command is simply that, a single command mnemonic uplinked in response to a request from a commanding application (Scripting, Scratchpad Line Directives, Display Operation, and Command Operation).

Command Group

A command group is a list of sequenced commands which are intended for uplink in response to a single user request. The following attributes define command groups:

- Groups allow many commands to be packaged into one transmission to the spacecraft.
- Groups may contain no hazardous commands.
- A single modifiable command may be listed within a command group many times, with each instance of the command containing a different set of modifiable data stored within the group definition.
- Many command groups may be created by the user and stored as UDEs.
- Command group definitions may only be generated from within the Command Group Generation application during periods when the command server is active and is maintaining an active OCDB.

Time-tagged Commands

Time-tagged commands are commands which are uplinked to one of two queues on the Command and Control MDM, the General Purpose queue or the Communications and Tracking queue, for execution at a later time. The Central Command Processor (CCP) verifies that the execution time specified for a time-tagged command is not in the past or beyond a configurable maximum time in the future (the maximum allowable time in the future is 336 hours).

Command Files

Space Station commanding provides for both uplink and downlink of program files. It should be noted that program files are only exchanged with the Payload MDMs. Files to be uplinked by a user will not be maintained and configuration controlled in the OCDB. Instead, the files will reside on a platform that is recognized by the command server as being the sole source for uplinkable data files within a particular project. For a file uplink to the ISS to occur, the file must first be resident on the PIMS Server. The PIMS server is the sole source of files uplinked from EHS to the ISS. The EHS provides for file uplinks to the Payload MDM or payloads controlled by the Payload MDM only.

GSE Files

Users have the capability to transfer Ground Support Equipment (GSE) files to a workstation for purposes of automating the command update process. For Command Subsystem purposes, these GSE files will contain updates to data sets, commands, and groups stored in the OCDB.

Command Data Set

Modifiable commands are commands which include modifiable data fields. For any given modifiable command, command data sets may be defined which specify values for the modifiable data fields in the command. Command data sets can be used to simplify the uplinking of modifiable commands by allowing users to define values for the modifiable data fields in advance.

Each data set is uniquely identified by a command mnemonic and a data set name. The fields within each data set are identified by the corresponding command field mnemonics. Each modifiable field in the command must be represented in the command data set. Command data sets are not configuration controlled. Command data sets may be created, modified, and deleted by an authorized user without approval of the DBCG (Database Coordination Group).

Command Response

For each command uplinked, several types of command responses may be generated by the EHS Command Subsystem to indicate the status of the transmitted command. Command responses convey information about the command, such as its progress through the communication paths, integrity once onboard the flight system, deliverability to the end system or payload, status after execution, or other information.

Command Acceptance Response

A Command Acceptance Response (CAR) is generated by an intermediate transmission facility, for example, Mission Control Center - Houston (MCC-H), and indicates the reception of a command, block of commands, or file by that facility. Besides the command definition itself and a CAR time-out value, there is no additional information needed from the project's Command Database for the EHS Command Subsystem to properly process and report CAR data.

During Space Station command response processing, two CARs are received for each individual command uplinked by the Central Command Processor (CCP). The first CAR, CAR1, indicates status regarding the command reception and validation at MCC-H. This CAR is logged as either a success or failure. The second CAR, CAR2, indicates status regarding the command transmission from MCC-H. This CAR is logged as either a success or failure. In the case of CAR failure, details regarding the reason for the failure are in the delog CAR information.

Flight System Verifier

A Flight System Verifier (FSV) verifies an event onboard the spacecraft and may be generated by the spacecraft or a ground source. It can indicate the receipt of a command, Block of commands, or file by the onboard system. The receipt of an FSV by the EHS Command Subsystem does not guarantee a command's execution, but only indicates that the command was received onboard.

During Space Station command response processing, up to two FSVs are received in response to each individual command. The first FSV, FSV1, indicates the command status at the Command and Control MDM (onboard the ISS). This FSV is logged as either a success or failure. If the final destination of the command was the Command and Control MDM, this is the only FSV received in response to the command. The second FSV, FSV2, indicates the command response from the payload MDM. This FSV is also logged as either a success or failure. In the case of FSV failure, details regarding the reason for the FSV failure are in the delog FSV information.

Note: For information concerning FSV's as they relate to file uplinks, see the section entitled "ISS File Uplink Requests" later in this module.

Command Reaction Response

A Command Reaction Response (CRR) is any telemetry data or group of telemetry data that has been received by the EHS Command Subsystem in response to the execution of a previously uplinked command. CRRs are defined on a per command basis. Each defined command in the Command Database may have one, many, or no CRRs defined. For each individual command requiring a CRR-type confirmation, one or more telemetry MSIDs identifying the telemetry data containing the command's confirmation information must be defined and resident in the project's Command Database. For each of these telemetry MSIDs, an expected value or range of values must be specified. These values are used to establish the "pass" or "fail" status of the associated CRR. Each supplied telemetry MSID must be completely defined in the TDB. A CRR time-out must also be provided on a per-command basis to determine when the EHS Command Subsystem should end the CRR assessment.

ISS File Uplink Requests

In response to the HOSC issuing a file uplink request, Mission Control Center-Houston (MCC-H) sends an uplink request response (CAR1). When MCC-H begins processing the file uplink, a message indicating file uplink initiation (CAR2) is sent from MCC-H to the HOSC. MCC-H sends response messages indicating any error condition encountered in attempting to process the file uplink. MCC-H sends a response message upon file uplink completion (FSV1) which indicates that the file has been

uplinked to the United States On-Orbit Segment (USOS). MCC-H sends response messages indicating initiation of the file upload to the destination MDM (FSV2) and completion of the file upload to the destination MDM (FSV3). If the HOSC sends a file uplink termination request message during the uplink process, MCC-H will respond with a file uplink termination message when the process is terminated.

Concepts

Concepts, as used in this module, are presented to provide a broader picture of the command process in which some of the previously defined terms may be integrated and better understood. Since several applications will be discussed in later modules, an overview of the command architecture and command applications will also be presented.

Commanding Overview

A command is a collection of data words that can be uplinked from a ground system to a spacecraft specifying data, a collection of data words, or an action to be executed onboard. EHS command processing uplinks commands to a destination, such as the Space Shuttle or International Space Station, via an intermediate facility (see Figure 1-2. Commanding & Command Response Overview).

Note: In order to simplify this representation, all mention of Goddard Space Flight Center (GSFC) has been omitted. Generally, all data transmitted/received at Marshall Space Flight Center (MSFC) is relayed via domestic satellite (DOMSAT) through GSFC.

Command uplink patterns are transmitted at a rate configured during system initialization to an intermediate facility. For Space Station, commands are transmitted to the Space Station Control Center/Consolidated Control Center (SSCC/CCC); for Spacelab, commands are transmitted to the Mission Control Center/CCC (MCC/CCC), with both control centers being located at Johnson Space Center (JSC).

For each command uplinked, several command responses may be generated indicating the status of the command as it progresses from the HOSC to its destination. HOSC commands are uplinked (via the NASCOM network and DOMSAT) to JSC, where, if the command is successfully received, a Command Acceptance Response (CAR) is generated. The Command Subsystem will use the CAR to determine when the next command can be sent to the CCC, subject to a configurable time interval between commands.

From the CCC at JSC the command is uplinked again (via the NASCOM network and DOMSAT) to the White Sands Complex (WSC) where it is uplinked to the TDRSS (Telemetry Data Relay Satellite System) for final transmission to the spacecraft. Once received by the spacecraft, a Flight System Verifier (FSV) will be generated by a system onboard the spacecraft indicating the receipt of the command.

Once a command is uplinked, the Command Subsystem will obtain from the OCDB the MSIDs associated with the uplinked command, the time delays required for command execution, and the telemetry values expected to be downlinked in response to the command's execution. Each command in the OCDB may have one, many, or no telemetry MSIDs specified for the command's CRR computation. Each MSID, in turn, has a specific telemetry value or a range of telemetry values. These telemetry values act as verifiers to the Command Subsystem because they reveal the execution status of the command with which the MSID is associated. Also specified in the database for each MSID is a maximum time to wait for the telemetry data to reach its expected state before issuing a time-out error.

Once the information necessary to monitor the command's execution status has been obtained by the Command Subsystem from the OCDB, it will wait the specified time period and will then begin searching the project's downlinked telemetry data for the specified MSIDs and their values. When all requested MSIDs have been found in the downlink, or the time-out period has elapsed, the Command Subsystem will evaluate the results of all the telemetry verifiers compiled and will compute a single "pass/fail" status. In order to achieve a "pass" value for the CRR, all telemetry verifiers associated with the CRR must reach their expected telemetry value or be within the expected range of values before the time-out period has elapsed. If even one verifier fails, the entire CRR is returned with a "fail" status. If a "fail" status is detected, the actual telemetry data and the predicted value will be reported to the user.

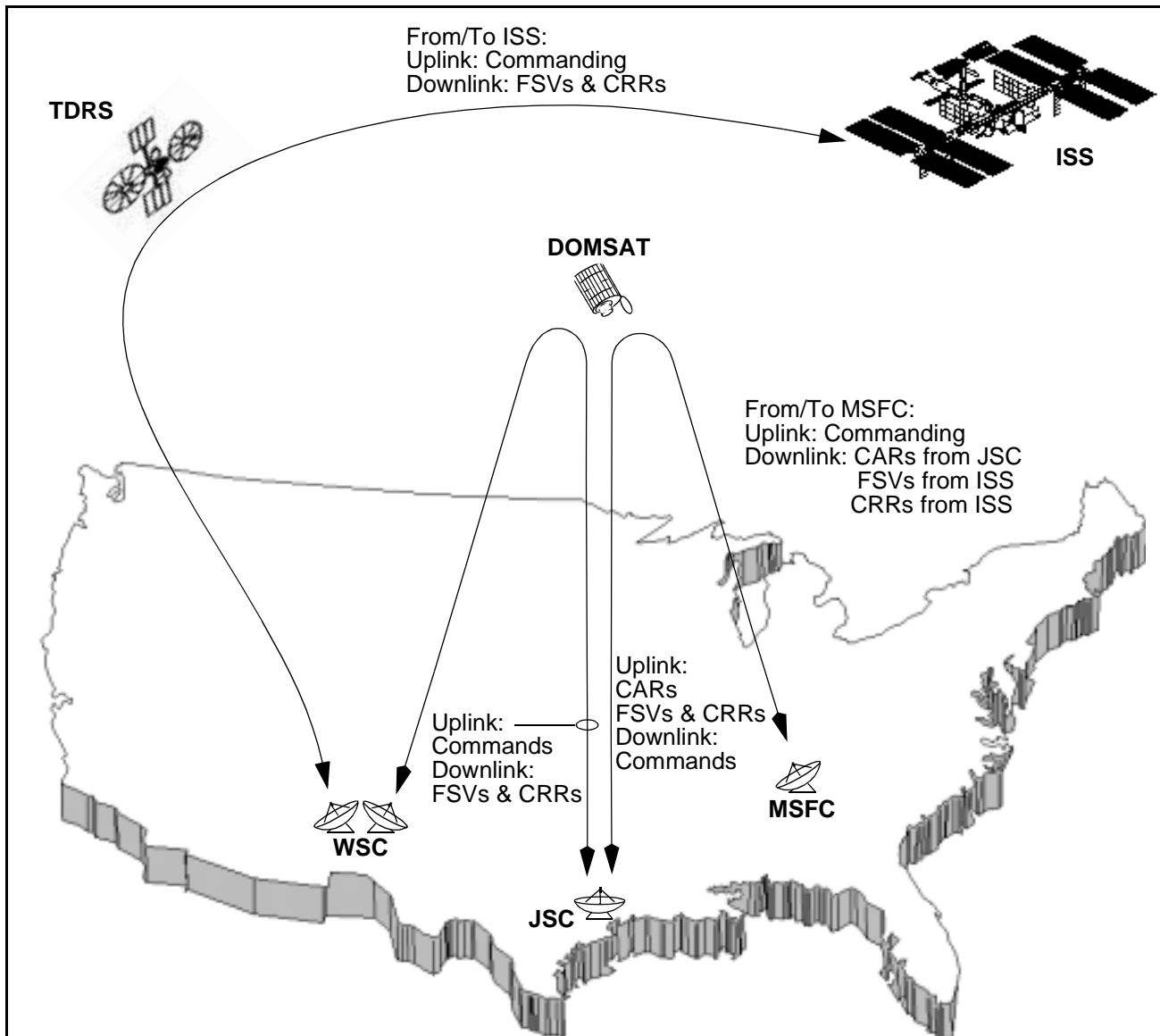


Figure 1-2. Commanding & Command Response Overview

Command Architecture

To begin, please direct your attention to Figure 1-3. Commanding Architecture, for an overview of the equipment used in the command process. The EHS is a distributed processing system in that the majority of the processing required by user initiated applications is performed on that user's workstation. The EHS workstation provides a multi-application windowed environment for access to the EHS applications. Each user has certain privileges dictated by the user profile which controls access to the applications.

While just about everything you need is sitting in front of you in the form of an EHS workstation, it may be helpful to have an idea of the bigger picture. The SMAC server maintains the system configuration files for all projects which are available to a project LAN during system initialization and mission operations. The database central servers maintain the configuration controlled databases for all projects and the command server provides a central control point where real-time command images are built and uplinked. The telemetry server (synonymous with project server) provides three major functions: perform front-end processing for telemetry, log telemetry, and run applications required by multiple users.

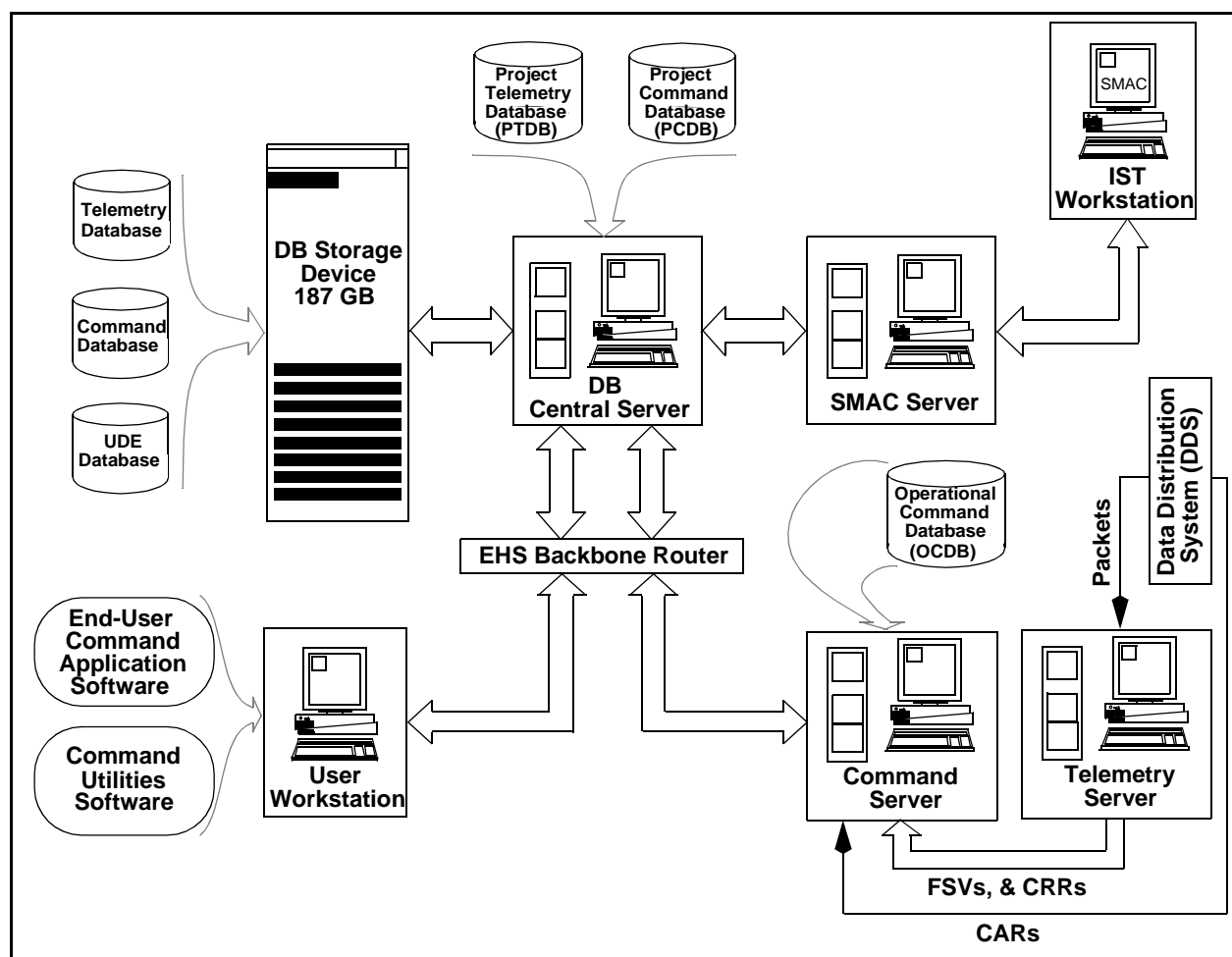


Figure 1-3. Commanding Architecture

The **Database (DB) Central Server** hosts the EHS database management system. This system hosts the configuration-controlled telemetry and command database definition information and provides centralized storage for user-generated data elements (UDEs) (i.e., computations, displays, scripts, etc.). The system provides a configuration management capability for the submission and control of ground processing support data (i.e., telemetry and command databases).

During periods of operational support the required PTDB and PCDB are resident on the DB Central Server. The UDE DB, however, remains in the DB Storage Device with the DB Central Server providing responses to Store/Retrieve requests from individual workstations to the DB Storage Device.

Unlike project servers, command servers and workstations, the DB Central Servers are not initialized for support of a particular EHS mission or activity. Each of the database servers is permanently allocated to an EHS supported project. The Database Servers must be available for development during and between all missions. Also, the Database Servers must be available for development of UDEs between missions. The Database servers are brought down only for maintenance.

The **Command Server** functions as the EHS gateway for all project commanding activities. This system has the capability to receive commands from local and remote systems, User Ground Support Equipment (UGSE), and remote user facilities. Upon receiving a command, the server executes the appropriate validation processes and checks for hazardous commands before performing the actual command uplink. The system makes command acceptance responses and command activity reports available to the initiating user. The Command Server provides the capability to monitor telemetry values in response to commands and provides messages to the command initiator.

The **Operational Command Database (OCDB)** resides on the Command Server. The database tables necessary for the OCDB are created by the Database Monitor and Control utilities (initiated through the **SMAC Server**) since Database Monitor and Control is responsible for monitoring database disk and table spaces. Command Database provides a process for populating the OCDB tables using data from the baselined PCDB (resident on the DB Central Server) for the specified project and mission/increment. This process retrieves data from the baselined PCDB, including the non-configuration controlled command data set and modifiable command chain definitions, and populates the specified OCDB tables. The uplink patterns for all predefined and complete modifiable commands are generated at this time and stored in the OCDB.

The **Telemetry Server** delivers command responses to the commanding subsystem. CARs are received by the telemetry server from an intermediate facility in the form of NASCOM 4800-bit blocks. The NASCOM block is processed and formatted into a packet and then distributed to the Command Server. Similarly, FSVs and CRRs are received in the telemetry downlinked from the vehicle, processed, packetized, and distributed to the Command Server.

End-User Command Applications

The information presented in Figure 1-4. Command Applications Overview, concisely describes the software involved in EHS commanding. Command functions are organized in a logical flow from left to right. In the following modules we will be discussing each of these applications with the exception of Command System Management which is a privileged function.

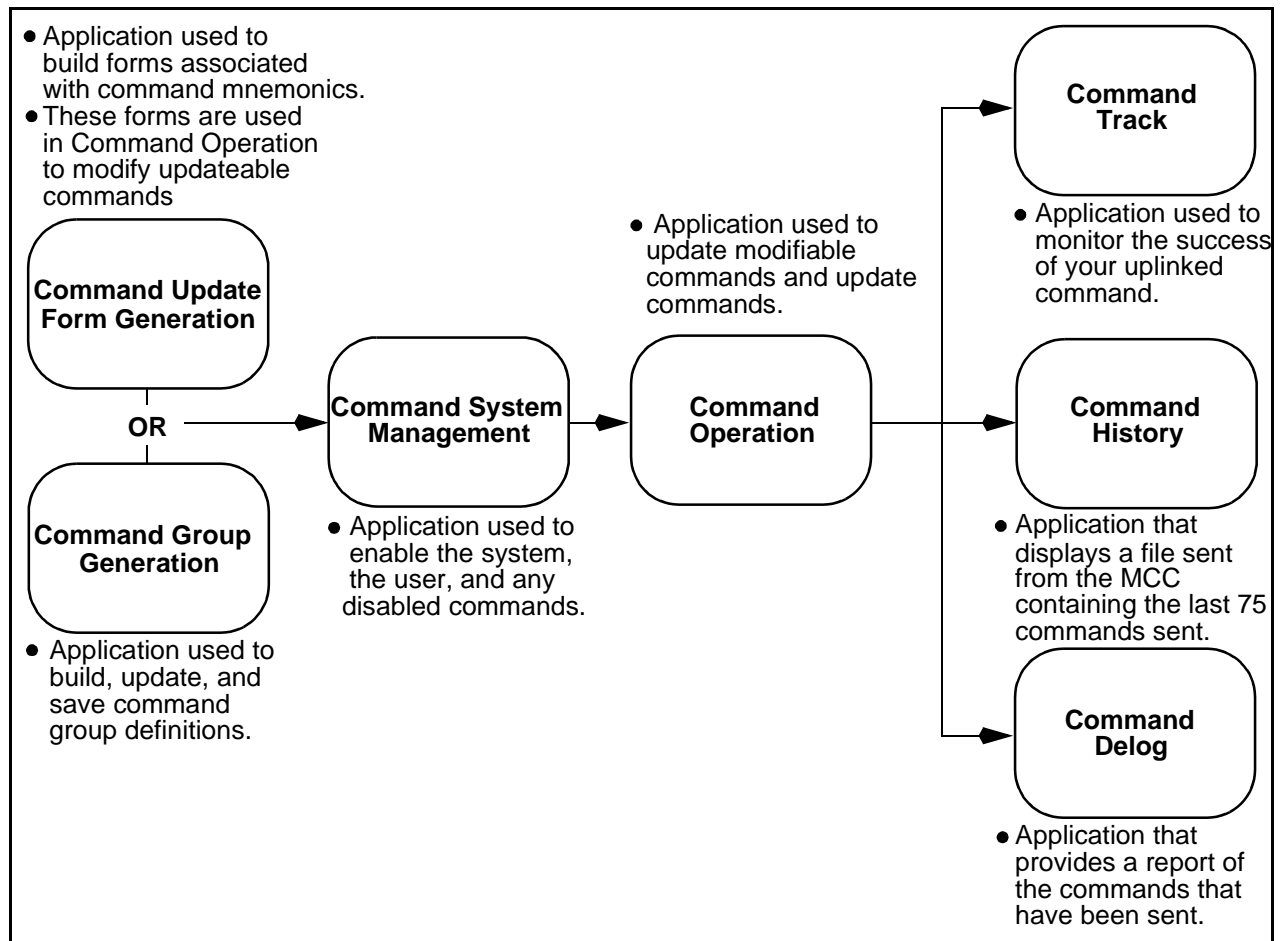


Figure 1-4. Command Applications Overview

Starting the End-User Command Applications

To start the Command Update Form Generation application, click on the **Generation** menu from the **Launchpad**, and then click **Command Uppdate Form Generation** (see Figure 1-5. Launchpad Generation Menu).

You can start the Command Group Generation application by clicking on the **Generation** menu from the **Launchpad** and then clicking **Command Group Generation**.

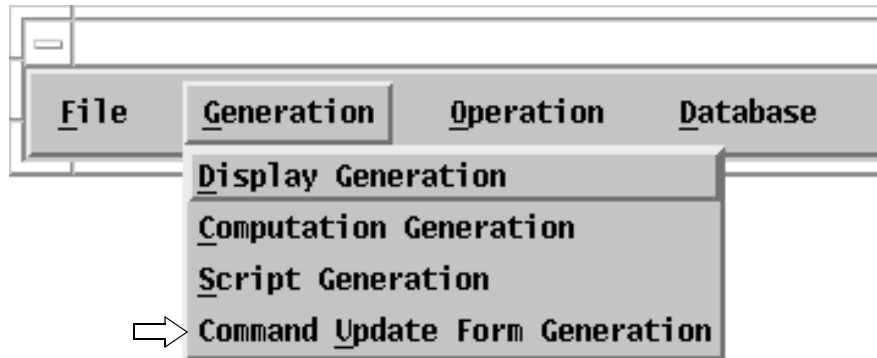


Figure 1-5. Launchpad Generation Menu

To start the Command Operation, Command Track, Command Delog, or Command History application, click on the **Operation** menu from the **Launchpad**, and then click the appropriate menu option (see Figure 1-6. Launchpad Operation Menu).

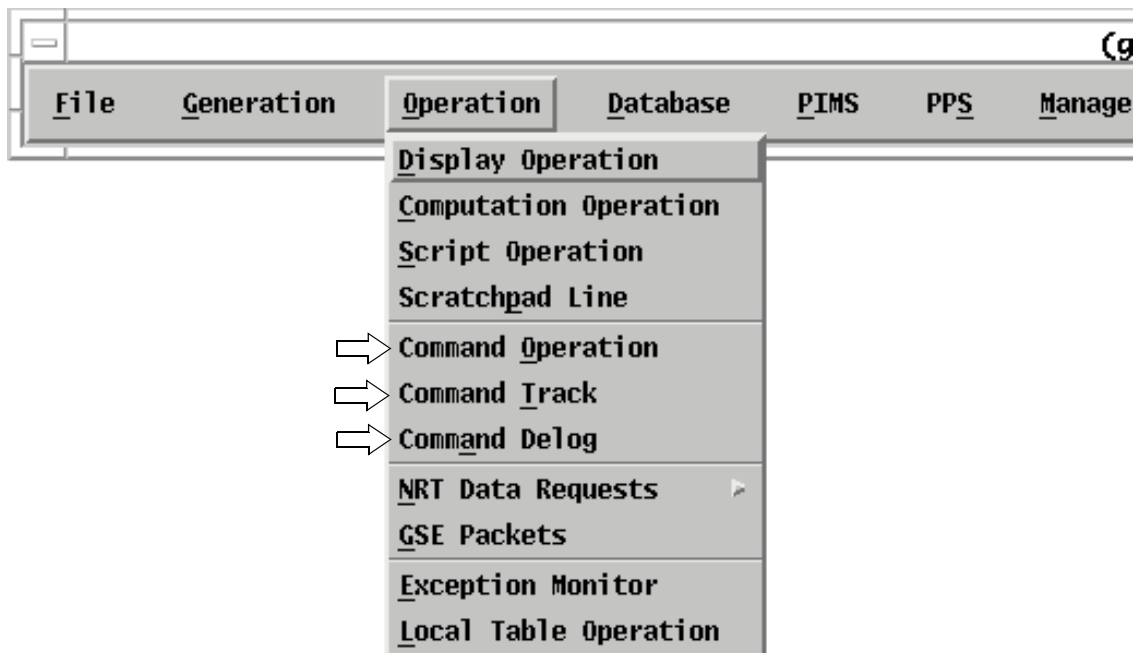


Figure 1-6. Launchpad Operation Menu

Summary

This module has laid the groundwork for an understanding of the End-User Command Applications, beginning with a definition of the individual databases and the terms used in commanding. We defined command types, Command update forms, command designations, command uplink methods, and command responses. We continued by presenting an overview of commanding between the ground and an orbiting spacecraft, defining uplink and downlink characteristics. We discussed the operational concepts between EHS workstations, various servers and where the individual databases are resident. We concluded with a brief discussion of the applications making up the End-User Command Applications which will be discussed in the following modules.

With the conclusion of this module you should:

- define the terms and definitions pertinent to commanding in the EHS
- illustrate the operational relationship between workstations and servers
- define the applications which comprise the End-User Command Applications

Questions

Instructions

Indicate the answers for each question below. The correct answers are given immediately following in the **Answers** section.

1. Match the following terms to their definitions

- | | |
|--------------|-----------------------|
| a. CDB | f. FSV |
| b. PCDB | g. Predefined Command |
| c. OCDB | h. Modifiable Command |
| d. GSE Files | i. Critical Command |
| e. CRR | j. Hazardous Command |

___ may be updated by a user prior to or during a mission

___ telemetry data or group of telemetry data that has been received in response to a previously uplinked command

___ contains the command data set and command chain definitions and uplink patterns

___ command whose initiation and execution could cause possible damage to a payload or spacecraft

___ provides the capability to access and manipulate data in PCDB

___ generated by system onboard the spacecraft to indicate receipt of a command, block of commands or file

___ completely defined in the Command Database prior to mission

___ command whose initiation and execution could pose a threat to human life or the entire mission

___ contains command definitions needed to drive HOSC command processing

___ contains updates to data sets, commands and chains stored in OCDB

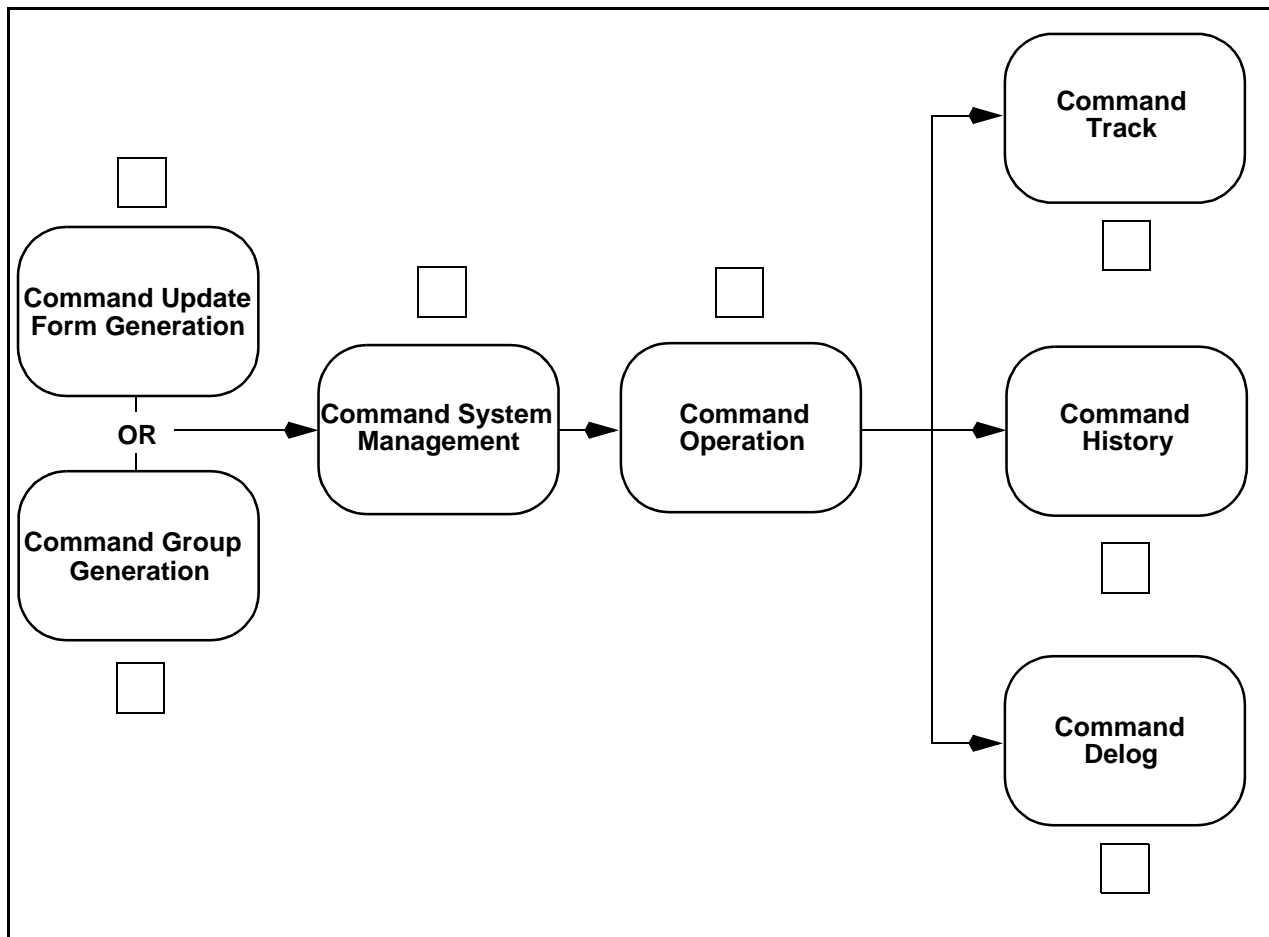
2. True or False. Groups may contain no hazardous commands

3. True or False. The receipt of an FSV guarantees a command's execution.

4. The database tables necessary for the OCDB are created by the _____ utilities

5. In the diagram below match the application's description to it's block.

- a. Application used to update modifiable commands and update commands.
- b. Application that provides a report of the commands that have been sent.
- c. Application used to build forms associated with command mnemonics.
- d. Application used to monitor the success of your uplinked command.
- e. Application used to enable the system, the user, and any disabled commands.
- f. Application that displays a file sent from the MCC containing the last 75 commands sent.
- g. Application used to build, update, and save command group definitions.



Answers

1. Match the following terms to their definitions

- | | |
|--------------|-----------------------|
| a. CDB | f. FSV |
| b. PCDB | g. Predefined Command |
| c. OCDB | h. Modifiable Command |
| d. GSE Files | i. Critical Command |
| e. CRR | j. Hazardous Command |

h may be updated by a user prior to or during a mission

e telemetry data or group of telemetry data that has been received in response to a previously uplinked command

c contains the command data set and command chain definitions and uplink patterns

i command whose initiation and execution could cause possible damage to a payload or spacecraft

a provides the capability to access and manipulate data in PCDB

f generated by system onboard the spacecraft to indicate receipt of a command, block of commands or file

g completely defined in the Command Database prior to mission

j command whose initiation and execution could pose a threat to human life or the entire mission

b contains command definitions needed to drive HOSC command processing

d contains updates to data sets, commands and chains stored in OCDB

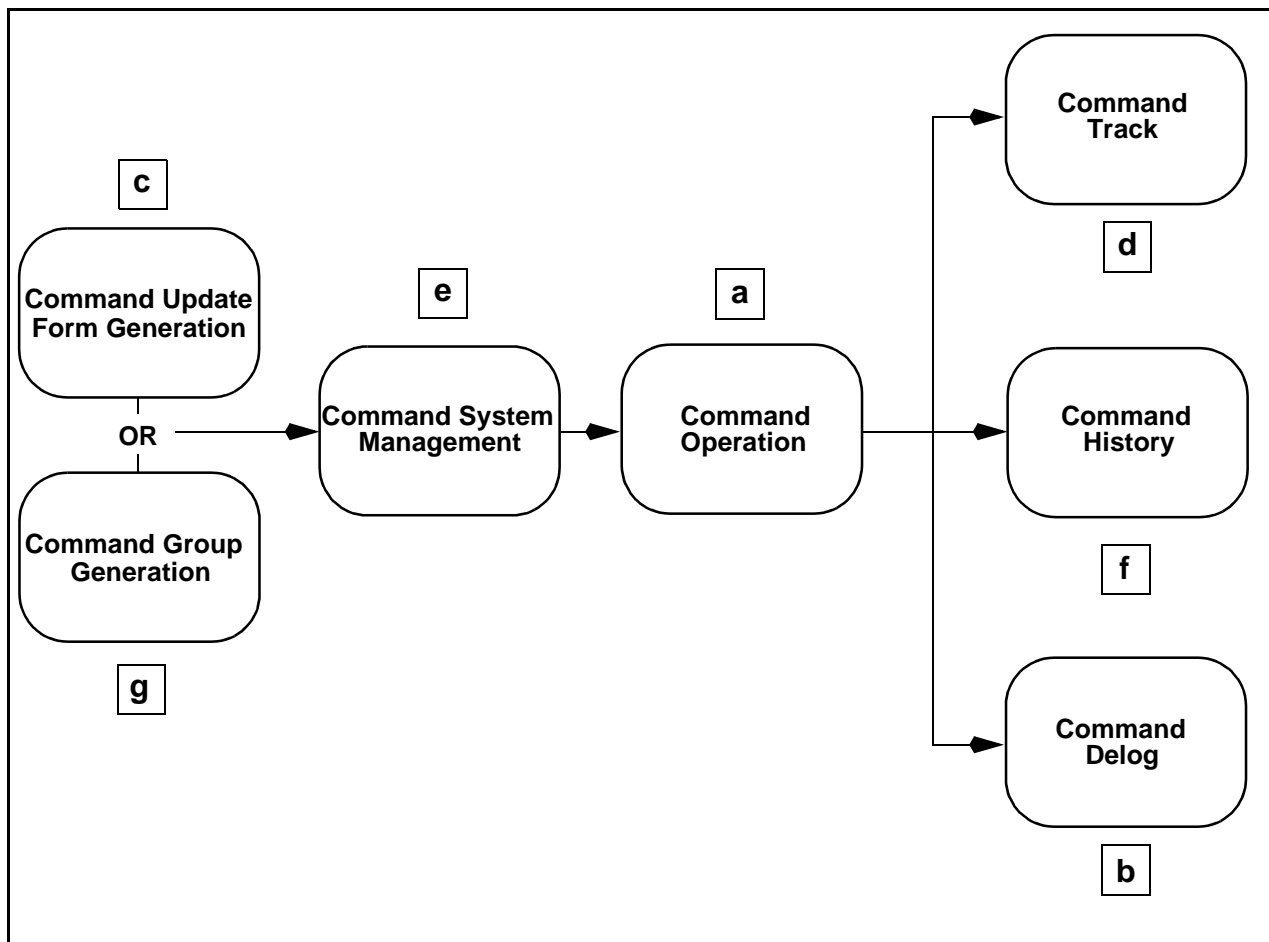
2. **True**. Groups may contain no hazardous commands

3. **False**. The receipt of an FSV does not guarantee a command's execution, but only indicates that the command was received onboard.

4. The database tables necessary for the OCDB are created by the **Database Monitor and Control** utilities

5. In the diagram below match the application's description to it's block.

- a. Application used to update modifiable commands and update commands.
- b. Application that provides a report of the commands that have been sent.
- c. Application used to build forms associated with command mnemonics.
- d. Application used to monitor the success of your uplinked command.
- e. Application used to enable the system, the user, and any disabled commands.
- f. Application that displays a file sent from the MCC containing the last 75 commands sent.
- g. Application used to build, update, and save command group definitions.



Module 2

Command Update Form Generation

Objectives

The Command Update Form Generation application provides you with the means to create, edit, save, validate, and print command update forms to be used to update modifiable commands you are authorized to access. In this module you will learn:

- how to generate command and header forms
- how to open, regenerate, and bulk generate command forms
- how to add predefined fields
- how to set text and field attributes
- how to validate a command update form

As implied by the module title, this module will concentrate on the Command Update Form Generation application and several (but not all) of the menu options obtainable via the main window. In order to avoid numerous, individual sets of directions on how to navigate to menu options, Figure 2-1.

Application Menu Options, is presented as a one-time guide to locating the menu options that will be covered in this module. As indicated by the arrows, the following options will be discussed:

- Generate Command Form...
- Generate Header Form...
- Open...
- Regenerate...
- Bulk Generate Command Forms...
- Bulk Generate Header Forms...
- Add Predefined Fields...
- Set Object Attributes...
- Validate...

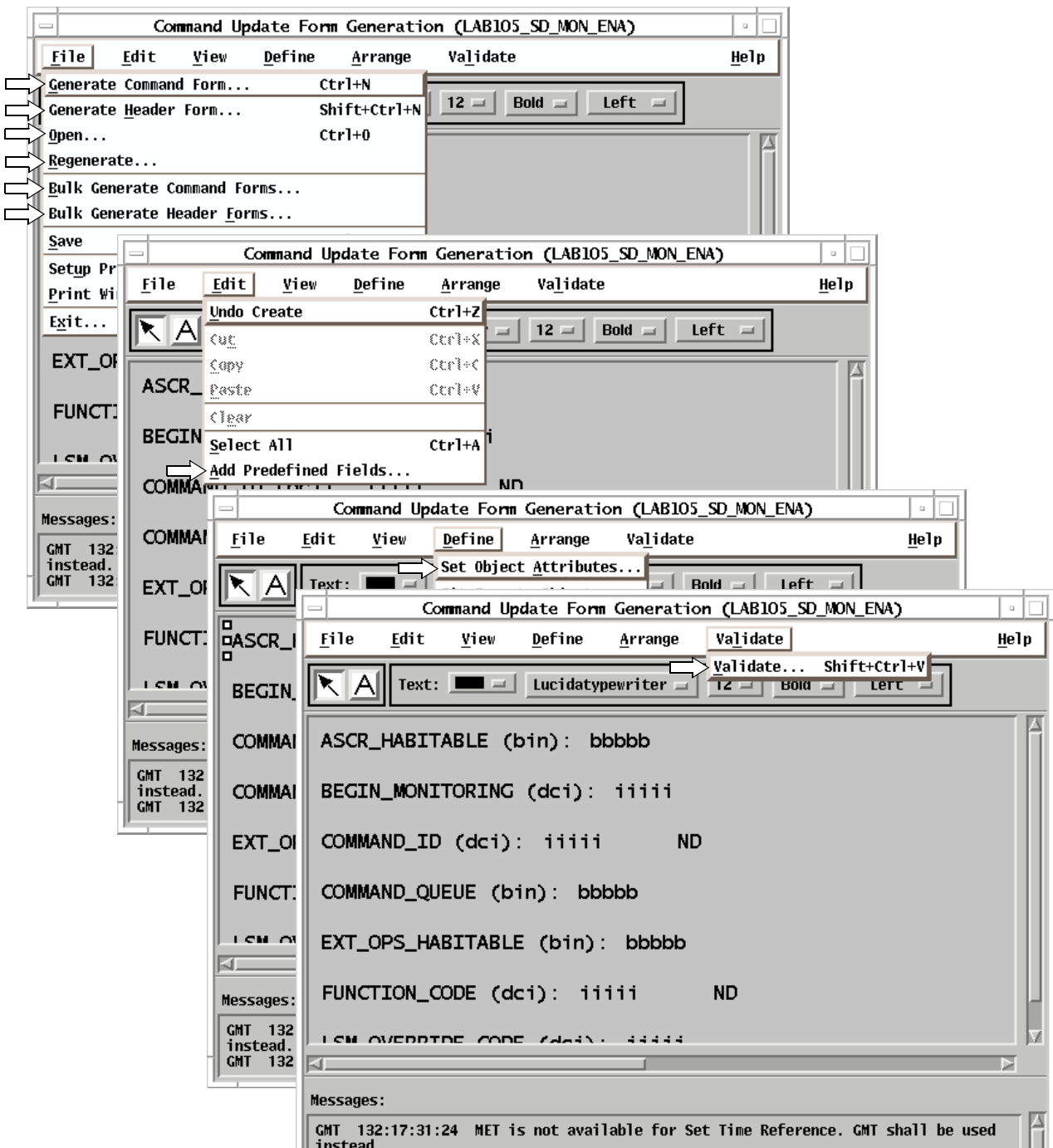


Figure 2-1. Application Menu Options

Overview

Forms created with this application, while stored on your local platform, may also be stored in the User-Generated Data Element (UDE) database like displays, computations, scripts, etc. System-provided, fixed format forms are invoked for variable-length commands so that you can view and modify the information contained in the single, variable-length, modifiable field, but you can't customize how

information on a system-provided form is displayed. System-provided forms may also be used to view data within predefined commands.

You can only have one update form for each command or header. A bulk generation option is provided so that default forms may automatically be created for many commands at one time.

Once you've created an update form, you use the Update Command mini-application (available through Command Operation (see Module 3, Command Operation), Script Operation, Display Operation, and the Scratchpad Line applications) to actually view, modify, and update the command in the Operations Command Database (OCDB). The Command Operation application is used to initiate the command uplink.

Generate Command Form

The Generate Command Form dialog box provides you with the means to create a command update form for those commands that do not have a command update form generated (stored locally on your workstation). Command update forms provide you with the mechanism necessary to change data in modifiable fields using the Update Command mini-application invoked from within Command Operation.

Exercises

Instructions

The following "Try It" directs you through the process of generating a command update form. Carefully read and complete each step.

Try It...


1. From the **Command Update Form Generation** menu bar, select the **Generate Command Form...** menu item from the **File** menu. This invokes the **Generate Command Form** dialog box.

2. Select a command database to use.


Note: For purposes of this "Try It" any command from the Mnemonic Selection List will provide the desired result.

3. If you know the command mnemonic (example, HW28BIT), you can enter it in the **Generate:** input text field,

OR,

Supply search criteria (example, H*) in the **Mnemonic Filter:** text field and click . Your commands that match the filter criteria will be displayed within the mnemonic selection list. If you entered a specific

command in the **Mnemonic Filter**, the matching command will be returned to the mnemonic selection list.

4. Select the command that you want to generate an update form for from the mnemonic selection list. The selected command will be displayed in the **Generate:** input text field.
5. To further define your form's format, identify whether you want to include all command fields (both predefined and modifiable), only modifiable fields, or if you want to copy a pre-existing master form. Click on .

Note: If you generate a command update form that only includes modifiable fields, you can later add any or all predefined fields associated with the command using the **Add Predefined Fields** dialog box accessible from the **Edit** menu. See the “Add Predefined Fields...” section later in this module for more information.

6. You will be returned to the **Command Update Form Generation** main window where the form will be displayed.
7. When you are satisfied with your results, select **Save** from the **File** menu.
8. Generate forms for other predefined and modifiable commands, ensuring that they are all saved to your workstation.
9. When you are satisfied with your results, select **Exit...** from the **File** menu.

Generate Header Form

Generally, headers contain routing information and like command update forms, may be comprised of both predefined and modifiable fields. The header is appended as a preface to a command before it is uplinked. Each command may have only one header assigned to it. When a header form is opened within the Update Command mini-application (see Module 3, Command Operation), it will be displayed with the information relevant to its associated header.

Exercises

Instructions

The following “Try It” directs you through the process of generating a command header form. Carefully read and complete each step.


Try It...

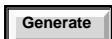
1. From the **Command Update Form Generation** menu bar, select the **Generate Header Form...** menu item from the **File** menu. This invokes the **Generate Header Form** dialog box.
2. Select a command database to use.

Note: For purposes of this “Try It” any header from the Mnemonic Selection List will provide the desired result.

3. If you know the header mnemonic (example, HWCMDHDR), you can enter it in the **Generate:** input text field,

OR,

Supply search criteria (example, HW*) in the **Mnemonic Filter:** text field and click .

4. Your headers that match the filter criteria will be displayed within the mnemonic selection list. If you entered a specific header in the **Mnemonic Filter:** text field, the matching header will be returned to the mnemonic selection list.
5. From the mnemonic selection list, select the mnemonic for which you want to generate a header update form. The selected mnemonic will be displayed in the **Generate:** input text field.
6. To further define your form’s format, identify whether you want to include all header fields (both predefined and modifiable), or only modifiable fields.
7. Click on .
8. You will be returned to the **Command Update Form Generation** main window where the form will be displayed.
9. When you are satisfied with your results, select **Save** from the **File** menu and then select **Exit...**

Open

The Open dialog box allows you to open command or header update forms that are stored on your local workstation. If the files are not found on your workstation, you may have to retrieve them from the UDE database.

Note: If you want to regenerate a form, this option must be used to open the form first.





Exercises

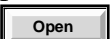
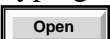
Instructions

The following “Try It” directs you through the process of opening an existing update form. Carefully read and complete each step.

Try It...

1. Invoke the Command Update Form Generation application from the **Launchpad**.
2. Click on the **F**ile menu.
3. Click on the **O**pen... menu item.
4. The **Open** dialog box will be invoked.

Note: The **Filter:** text field on the **Open** dialog box contains the asterisk wildcard which results in all forms being shown in the **Files:** area. To narrow this list, you can specify filename filtering criteria and click  or press  to initiate the  function.  is the default pushbutton action when the cursor is in the **Filter:** input text field.

5. In the **Files:** area, you can open an update form by:
 - Double-clicking on its filename
 - Clicking once on the filename (the update form to be opened will be entered into the **Open:** text field) and then clicking on 
 - Typing a filename in the **Open:** text field, and then clicking on 

Bulk Generate Command Forms

This application allows you to automatically create command update forms for either all the commands that you can access that do not currently have an update form (stored on your local workstation) or for all your master commands that do not have an update form (stored on your local workstation). To save time, generate forms for master commands, and then generate individual forms from the master.


Note: You must use the **Open...** menu item to view a form built using the Bulk Generate option.

Exercises

Instructions

The following “Try It” directs you through the process of bulk generating command update forms. Carefully read and complete each step.

Try It...

1. From the **Command Update Form Generation** menu bar, click on the **File** menu.
2. Select the **Bulk Generate Command Forms...** menu option.
3. The **Bulk Generate Command Forms** dialog box will be invoked.
4. Select a command database from the **Command Database:** selection list.
5. From the Mnemonic List Area you may:
 - a. Bulk generate command forms for all mnemonics in the list by selecting all mnemonics in the list (Ctrl + left mouse)
 - b. Bulk generate command forms for all Master Mnemonics in the list by selecting all the Master Mnemonics in the list (Ctrl + left mouse)
 - c. Select any number or combination of mnemonics from the list (Ctrl + left mouse) to bulk generate command forms for
6. Select/de-select Generate Master Forms Only radio button to bulk generate either Master Mnemonic or Mnemonic forms.
7. Select the appropriate radio button from the **Create on Form:** option to either generate **All Fields** or **Modifiable Fields Only**.
8. Click .
9. Results of the bulk generation will be displayed in the Message Area of the **Command Update Form Generation** main window.

Bulk Generate Header Forms

The Bulk Generate Header Forms application allows you to automatically create command header update forms for all commands you can access that do not currently have a header update form (stored on your local workstation).


Note: You must use the **Open...** menu item to view a form built using the Bulk Generate option.

Exercises

Instructions

The following “Try It” directs you through the process of bulk generating header update forms. Carefully read and complete each step.

Try It...

1. From the **Command Update Form Generation** menu bar, click on the **File** menu.
2. Select the **Bulk Generate Header Forms...** menu option.
3. The **Bulk Generate Header Forms** dialog box will be invoked.
4. Select a command database from the **Command Database:** selection list.
5. From the Mnemonic List Area you may:
 - a. Bulk generate header forms for all mnemonics in the list by selecting all mnemonics in the list (Ctrl + left mouse)
 - b. Select any number or combination of mnemonics from the list (Ctrl + left mouse) to bulk generate header forms for
6. Select the appropriate radio button from the **Create on Form:** option to either generate **All Fields** or **Modifiable Fields Only**.
7. Click .
8. Results of the bulk generation will be displayed in the Message Area of the **Command Update Form Generation** main window.

Add Predefined Fields


In the event you created an update form which included only modifiable fields and then want to also include predefined fields, the **Add Predefined Fields** dialog box allows you to selectively add predefined fields to your form. The **Add Predefined Fields** dialog box has two lists with arrow buttons between them to facilitate the movement of fields on and off of the update form.

Exercises


Instructions


The following “Try It” directs you through the process of adding predefined fields to previously created update forms. Carefully read and complete each step.

Try It...


1. From the **Command Update Form Generation** menu bar, click on the **File** menu.
2. Select the **Open...** menu option and select a command update form from the **Files:** list and click .
3. From the **Edit** menu of the **Command Update Form Generation** main window select **Add Predefined Fields...**
4. The **Add Predefined Fields** dialog box will be invoked.

Note: If there are no fields listed in either the **Fields Not On Form:** or **Add To Form:** columns, you have selected a command form that possibly has all the predefined fields included in it:

- a. From the **File** menu of the **Command Update Form Generation** main window, select **Regenerate**.
 - b. Locate the **Create:** radio buttons on the **Regenerate** dialog box and click the **Modifiable Fields Only** selection.
 - c. Click .
 - d. The **Fields Not On Form:** column on the **Add Predefined Fields** dialog box should now be populated.
5. Select the predefined fields that you want to include in the Command Update Form.

6. Click the  to move these fields from the **Fields Not On Form:** column to the **Add To Form:** column.

7. Click .

Note: Clicking the  will have the same effect, however, the **Add Predefined Fields** dialog box will remain open.

Set Object Attributes

There are only three types of objects available within this application: text, predefined field, and modifiable field. A field consists of a label and a data field. As a result, the **Set Object Attributes...** menu item invokes one of two dialog boxes, either the **Set Text Attributes** dialog box or the **Set Field Attributes** dialog box, depending on the type of object selected. Both of these dialog boxes will be addressed below.

Set Text Attributes

The Set Text Attributes dialog box is used to change the way your text is shown on an update form. You must have text (not a field or field label) selected in order for this dialog box to be invoked. This dialog box is comprised mainly of option menu buttons that provide you with your choices.

Note: Text attributes can also be changed from the Tool and Attribute Bar (see Figure 2-2. Tool and Attributes Bar).

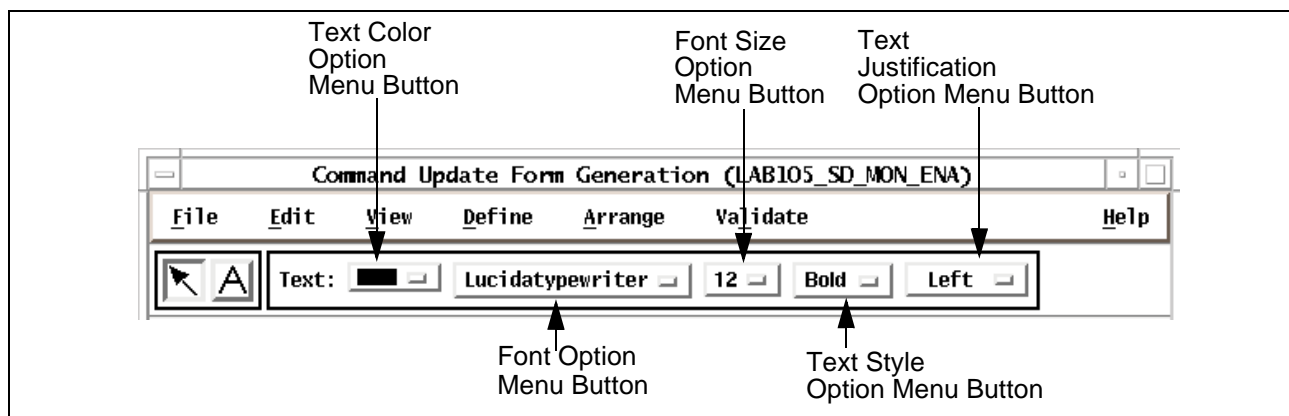


Figure 2-2. Tool and Attributes Bar

Set Field Attributes

The Set Field Attributes dialog box is used to change the way information within predefined and modifiable fields is shown on an update form. You must have a field selected in order for this dialog box to be invoked.

Note: On this dialog box it is important to note the **Field Attributes** frame, **Number System/Notation:** option menu button. Data representation options available are based on the mnemonic's uplink data type as specified in the command database (see Table 2-1. Number System/Notation: to Uplink Data Type Comparison).

Table 2-1. Number System/Notation: to Uplink Data Type Comparison

This Option is Available When...	This Uplink Data Type is Specified
Binary/Integer Option	Discrete Integer Unsigned Integer
Character/String Option	ASCII Character EBCDIC Character String Discrete Integer* Unsigned Integer*
Decimal	Binary Coded Decimal Distended Signed Integer
Decimal/Integer Option	Unsigned Integer
Decimal/Real Option	IBM Floating Point Sign and Magnitude Signed Integer (2's Complement) IEEE Floating Point
Decimal/Scientific Notation Option	IBM Floating Point Sign and Magnitude Signed Integer (2's Complement) IEEE Floating Point
Hexadecimal/Integer Option	Unsigned Integer
Octal/Integer Option	Unsigned Integer



* - If state codes are defined for field types Discrete Integer or Unsigned Integer then the only available option will be Character/String Option.

Exercises


Instructions

The following “Try It” directs you through the process of setting object attributes on command/header update forms. Carefully read and complete each step.

Try It...

1. Use the Command Update Form from the previous “Try It...”.
2. Select the Text Tool  from the Tool and Attribute Bar and provide a title for this Command Update Form somewhere within the Work Area of the form.
3. Using the Select Arrow  from the Tool and Attribute Bar select the text that you added in step 2.
4. From the **Define** menu of the **Command Update Form Generation** main window select **Set Object Attributes...**

Note: If you position the mouse pointer in the work area and press the right mouse button, you will invoke the Form Popup Menu which provides an alternative means to perform the various listed functions.

5. The **Set Text Attributes** dialog box will be invoked.
6. Using the option menu buttons select your preferred attributes, click  when done.

Note: You may want to query the Command Database using the Command Database application to see what input data type is needed. Refer to Integrated Database Class (Course 2050) for details.

7. The text attributes as defined will be assigned to the selected text in the Command Update form.
8. Select one of the predefined/modifiable fields on the opened Command Update form.
9. From the **Define** menu of the **Command Update Form Generation** main window select **Set Object Attributes...**
10. The **Set Field Attributes** dialog box will be invoked.
11. Using the text entry fields, radio buttons, or option menu buttons modify the attributes you wish to assign to the selected label and data fields.

12. Click .

13. The field attributes as defined will be assigned to the selected fields in the opened Command Update form.

Regenerate

If you have already created an update form for a particular command or header mnemonic, the Regenerate menu item allows you to revert back to the initial default form for that mnemonic. The Regenerate menu item is only available if an update form is currently displayed in the work area.

Exercises


Instructions

The following “Try It” directs you through the process of regenerating an existing update form. Carefully read and complete each step.

Try It...

1. From the Command Update Form Generation menu bar, click on the **F**ile menu.
2. Click on the **R**egenerate... menu item.
3. The **Regenerate** dialog box will be invoked.
4. Select a Command Database from the **Database Selection List**.

Note: The name of the currently opened update form will be displayed in the **Create Options Area** of the **Regenerate** dialog box.

5. From the **Create:** radio buttons select whether you want to include all command fields (both modifiable and predefined) or just the modifiable fields in the form regeneration.
6. Click .

Validate


The Validate menu item allows you to check command fields on the opened form against an available PCDB. Forms should be validated when databases are delivered or when a pre-released database is available. The validation performed on a form ensures that the mnemonic and mnemonic field are valid against the PCDB and that all modifiable fields are present on the form.

Exercises

Instructions

The following “Try It” directs you through the process of validating a command update form against a PCDB. Carefully read and complete each step.

Try It...

1. From the Command Update Form Generation menu bar, click on the **Validate...** menu option.
2. The **Validate** dialog box will be invoked.
3. Click  .
4. Results of the validation will be displayed in the **Messages:** area of the Validate dialog box.

Summary

In this module we learned that command update forms are saved on your local workstation and may also be saved as UDEs in the UDE database. You can have only one update form for each command or header. The processes necessary to generate, open, regenerate, and bulk generate command and header forms were discussed. Once forms were created, we further learned how to add pre-defined fields, set object, text and field attributes, and finally how to validate forms.

With the conclusion of this module the student should be able to:

- demonstrate how to generate command and header forms
- demonstrate how to modify forms to suit your personal preferences

Questions

Instructions

Indicate the answers for each question below. The correct answers are given immediately following in the **Answers** section.

1. True or False. A command or header can have multiple Command Update forms.
2. Select the false statement from the following statements concerning the Set Object Attributes box.
 - a. Data representation options available are based on a mnemonic's uplinkdata type.
 - b. The Set Text Attributes dialog box is used to change the way your text is shown on an update form.
 - c. Uplink data type is determined by the selection made via the Data Representation option.
 - d. The Set Field Attributes dialog box is used to change the way information within predefined and modifiable fields is shown on an update form.
3. The validation performed on a form ensures that:
 - a. _____

 - b. _____

4. True or False. Bulk-generated command update forms are automatically displayed in the Command Update Form Generation main window.
5. What function does the Regenerate menu item perform?

Answers

1. **False.** You can only have one update form for each command or header.
2. Select the false statement from the following statements concerning the Set Object Attributes box.
 - c. Uplink data type is determined by the selection made via the Data Representation option. **A mnemonic's uplink data type is specified in the command database.**
3. The validation performed on a form ensures that:
 - a. mnemonic and mnemonic field are valid against the PCDB
 - b. all modifiable fields are present on the form
4. **False.** You must use the Open... menu item to see bulk-generated command update forms.
5. What function does the Regenerate menu item perform?

Allows you to revert back to the initial default form for a particular mnemonic.

Module 3

Command Operation

Objectives

The Command Operation application allows you to send commands to the spacecraft or payload. You can uplink commands, groups, chains and files. You are also able to update modifiable commands with forms that were previously generated with the Command Update Form Generation application. Command Operation also displays the current system status. In this module you will learn:

- how to use dialog boxes invoked through the Command Operation menus
- how to uplink individual commands, group commands, and files

As implied by the module title, this module will concentrate on the Command Operation application and several (but not all) of the menu options obtainable via the main window. In order to avoid numerous, individual sets of directions on how to navigate to menu options, Figure 3-1. Command Operation Options, is presented as a one-time guide to locating the menu options that will be covered in this module. As indicated by the arrows, the following options will be discussed:

- Command Inventory
- Header Inventory
- Group Inventory
- File Inventory
- Arrange Columns...
- Filter...
- Sort...
- Update...
- Uplink...
- Control Group Uplink...
- Control File Uplink...
- Configure Command System...
- Process GSE File...
- Command Summary...
- Find Mnemonic...

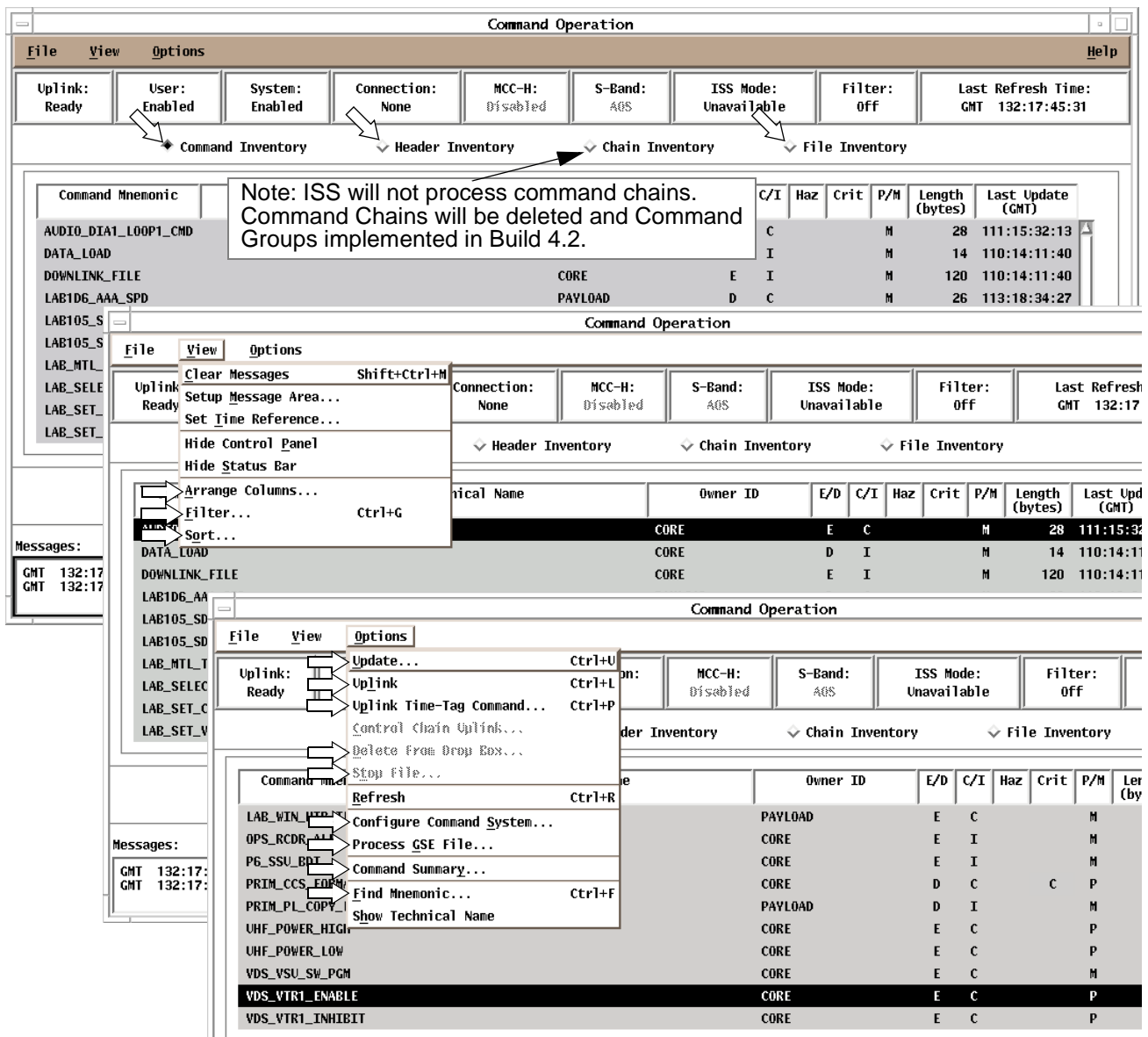


Figure 3-1. Command Operation Options

Overview

The Command Operation application allows you to see the current status of the command subsystem and supports the real-time uplinking of commands, command groups, and files to the spacecraft. You can use this application to create and customize command, command group, file, and command header inventories. You are also able to display command responses and general messages. Other features allow you to customize the manner in which information is displayed. Access to command update forms, groups, and files is provided.

Inventory Selection Radio Buttons

Inventory selection radio buttons are used to change the type of information displayed in the work area (see Figure 3-2. Work Area Variations). Choices available include:

- Command Inventory
- Header Inventory
- Group Inventory
- File Inventory

Depending on your inventory radio buttons selection and any filter you have defined, the contents of the work area will change. If you change from one inventory to the next, the contents of the work area will automatically be updated with the filter or sort specified. Inventory configurations implemented through sort, filter, etc. are not saved when you exit the application.

Points of Interest

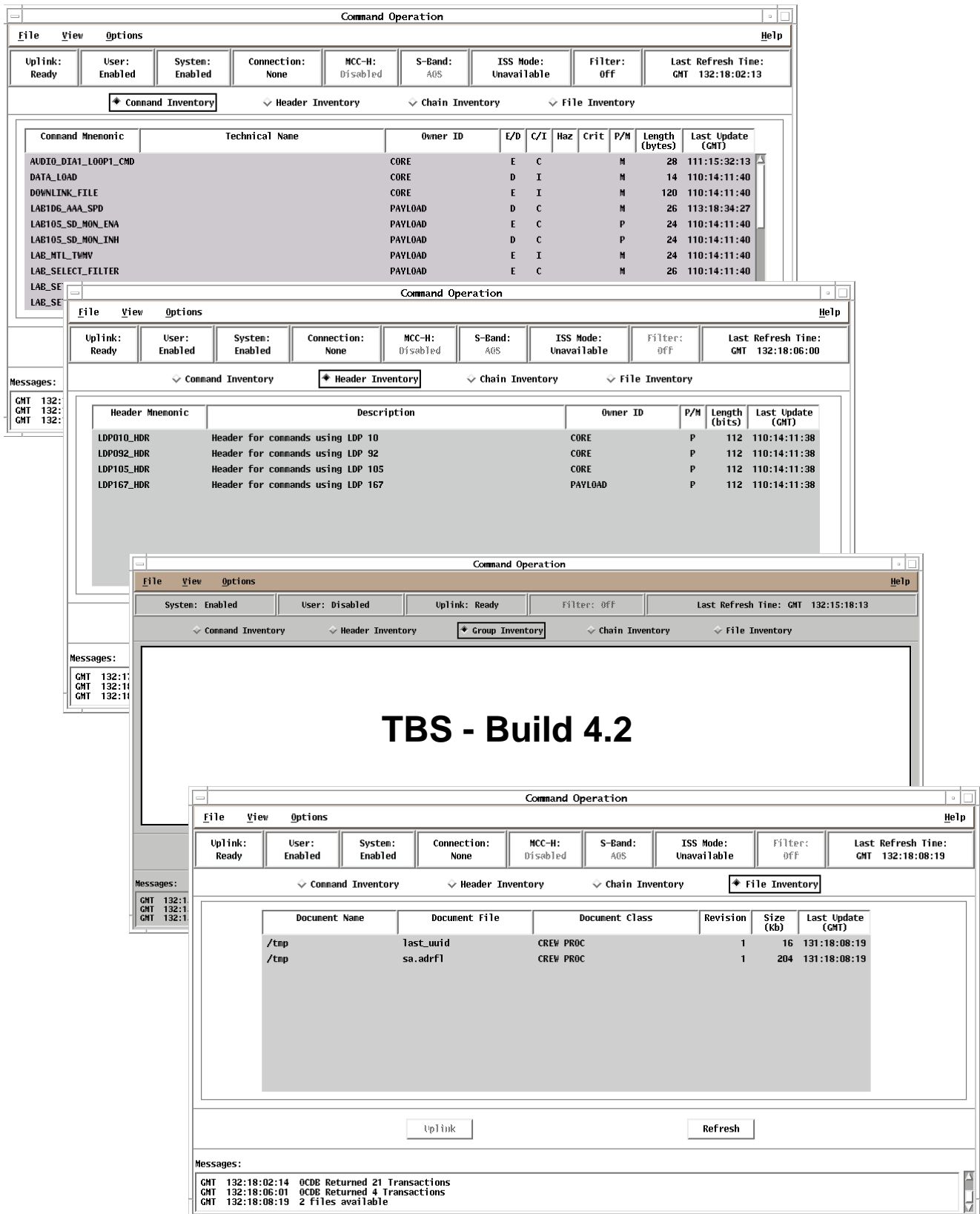
Previously undefined terms that appear in variations of the Command Operation main window are:

- **E/D** Entry will contain either **E** for an enabled command or **D** for a disabled command.

Note: If you are enabled to command but the status for the command you wish to uplink is disabled (**D**), you should contact the Command System Manager to have the command enabled.

- **C/I** Entry will contain either **C** for complete or **I** for incomplete. Complete indicates that if there were any modifiable fields defined for this command, data for the modifiable fields was provided.
- **P/M** A **P** in this entry indicates that the command is predefined and has no modifiable fields. An **M** in this entry indicates that the command includes at least one modifiable field.

Files are not maintained or managed by the OCDB. For International Space Station (ISS) users, uplink files are hosted on the Payload Information Management System (PIMS) server.






Note: Chain Inventory to be deleted in Build 4.2.

Figure 3-2. Work Area Variations

Arrange Columns

When this menu option is selected from the View menu you are presented with a dialog box containing a single **Columns:** list which displays all the columns displayed within the inventory of the Command Operation main window. Up and down **Shuffle** arrows are provided to change the order that the columns appear in the main window.

Arrange Inventory Columns:

1. Click on **A**rrange Columns... from the **V**iew menu.
2. Select an item from the **Columns:** list.
3. Click on the **Shuffle**  or  to rearrange the order of the selected column.
4. Repeat Steps 2 and 3 until the columns are in the desired order.
5. Click on .

Filter

When this menu option is selected from the View menu you are presented with a dialog box that allows you to set criteria which determines which commands or command chains are displayed in the Command Operation work area. This menu item is only available if you've selected the **Command Inventory** radio button. This menu item is insensitive (grayed out) when the **Header Inventory**, **Group Inventory**, or **File Inventory** radio button is selected.

Filter the Inventory Lists:

1. With the **Command Inventory** radio button selected, click on **V**iew.
2. Click on the **F**ilter... menu item.
3. Enter a combination of letters and wildcard characters into the text input fields for **Owner ID Filter:**, **Mnemonic Filter:**, or **Technical Name Filter:**, click on the appropriate radio buttons, and specify a particular time range.

Note: By default, each of these fields has an asterisk entered. This is the wildcard character which means "all". To narrow the number of commands or command chains displayed within the **Command Operation** work area, you can provide specific information in these fields or you can use a combination of real and wildcard characters.


4. When the filtering criteria have been appropriately identified, click . The results of the filtering process are displayed in the Command Operation main window.

Sort





The Sort option allows you to sort command inventories as displayed within the Command Operation work area according to your own personal preferences or operational necessities. This menu item is only available if you've selected the **Command Inventory** radio button. This menu item is insensitive (grayed out) when the **Header Inventory**, **Group Inventory**, or **File Inventory** radio button is selected.

Commands can be sorted by Column headings on a Command Inventory. Once the **Sort Order:** has been established (by use of the **Shuffle** arrows) commands can be further sorted in either ascending or descending order.

Sort Command Inventories:

1. With the **Command Inventory** radio button selected, click on the **Sort...** menu item from the **View** menu.
2. Select an item from the **Inventory Columns:** list and click on  **Add**.

Tip: You can also double-click to automatically add the element to the **Sort Order:** list.

3. Remove items from the **Sort Order:** list by clicking  **Remove**.
4. Repeat Steps 2 and 3 until all desired items are added to the **Sort Order:** list.
5. Arrange the items in the **Sort Order:** list by sort priority using the **Shuffle** buttons. Click on the **Shuffle**  or  to move a selected item up or down.
6. As you select each item in the **Sort Order:** list, ensure that the appropriate radio button specifying sort direction is selected, either **Ascending** or **Descending**.
7. Repeat Steps 5 and 6 until the columns are in the desired sort order and that each item is expected to sort in the desired direction.
8. Click on .

Update Option

The Update menu item invokes different functions depending on the inventory that you have displayed (see Table 3-1. Update Functions).

Table 3-1. Update Functions

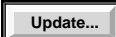
Inventory Selected	Update Function Invoked
Command Inventory	Update Command mini-application
Header Inventory	Update Command mini-application
Group Inventory	Update Command Group mini-application
File Inventory	Update function available through PIMS for Spacestation

Update Command mini-application

If you have the **Command Inventory** or the **Header Inventory** displayed, and a command within the work area selected, the **Update...** menu item initiates the Update Command mini-application which allows you to view and modify the contents of the selected command or command header. The selected command mnemonic can be:

- a command header
- a fixed-length modifiable command
- a fixed-length predefined command
- a variable-length modifiable command

The type of mnemonic you select will dictate the appearance of the **Update Command** main window. If you select a command header in the parent application, only the command header portion of the Update Command status bar and work area will display data. If you select a command mnemonic, then information relevant to the header and to the command will be displayed in the **Update Command** status bar and work area.

For example, if you select the **Command Inventory** radio button within the Command Operation application, all those commands which you can access are displayed in the **Command Operation** work area. If you then select a fixed-length modifiable command from the work area and click  or select **Update...** from the **Options** menu, the Update Command mini-application will be invoked and the selected command's update form will be displayed within its work area. If you haven't defined an update form for the selected command and a master command exists, then the update form for the master command will be used, otherwise the Update Command mini-application will not be accessible. The current values from the OCDB associated with each field on the form will be displayed, except when you are updating a command's value from a group, in which case the fields will be blank. You can either change the current values of the modifiable fields and update the command, or you can change the current values and save them as a named data set for that command. You can create as many data sets as you need for each fixed-length modifiable command.

A data set is:

- a copy of a command's modifiable field structure
- uniquely named
- associated with a single command

In the following illustration, a fixed-length, modifiable command (CMD01) with both predefined and modifiable fields is shown. Datasets A, B, and C have been defined in hexadecimal for each modifiable eight bit word of the command.

Example:

CMD01	AA	BB	CC	DD	EE	FF
Dataset A	A2	FF			B9	
Dataset B	56	24			C2	
Dataset C	77	5			FA	
Predefined Fields						
Modifiable Fields						

If you've built an update form for a fixed-length modifiable command, you can still invoke a system provided form. A menu item is available from the **Header** and **Command** menus which allows you to invoke a system-provided form. This form however, is for viewing only and cannot be used to modify the command. You must use your custom form to modify fixed-length, modifiable commands.

For fixed-length, predefined commands, system-provided update forms allow you to view the command's uplink pattern. You can also develop your own display-only update forms which allow you to customize the way in which predefined commands are shown within the Update Command work area. Fixed-length, predefined commands cannot be modified.

For variable-length, modifiable commands, system-provided update forms are invoked when you initiate the update function. The default system-provided form type is **Hexadecimal**. You can change the form type by selecting one of the alternatives available from the **Command** menu. Other system-provided forms allow you to modify command data in decimal, octal, binary, or text. Any changes you make must be in the native format of the system-provided form. You use the **Define Variable Field Length...** menu item under the **Options** menu to define the number of bytes to be included in a variable-length command. If the data is undefined in the database, one blank byte will be shown on the system-provided update form.

Note: The implementation of system-provided forms shows the header values in the command form's uplink pattern. This was only implemented for fixed-length commands. Header data is not shown in the command form for variable-length, modifiable commands.

Note: System-provided forms cannot be used to view the uplink pattern of hazardous commands. Therefore, the user-defined form is the only option available for modifying hazardous commands.

Note: Datasets are not User-Generated Data Element (UDEs). They can be created using either the Project Command Database (PCDB) or OCDB. They become part of the OCDB. When a new revision of the database is released, an IST member has the capability to save datasets to the OCDB prior to the build.

Uplink

When the **Command Inventory** or **File Inventory** is displayed and an individual command or file from an inventory is selected, The **Options** menu displays an **Uplink** menu item. Clicking **Uplink** results in the selected command or file being uplinked to the space vehicle.

When a command server receives an uplink request from a workstation, it verifies that:

- the command exists in the OCDB
- any modifiable fields associated with the command are complete
- you are authorized to access the command
- the command system is enabled for uplink
- you are enabled for uplink
- the selected command/file is enabled for uplink
- the submitting workstation is a valid source for commanding activities

For an uplink to be successful, all of the previously stated conditions must be true. If any of the conditions prove false, the command server will abort the uplink and will generate an error message. If no errors are encountered during the uplink request, then the submitted command(s) will be placed in the command queue. Commands in the command queue are “locked” and cannot be altered.

Uplink Time-Tag Command

ISS command processing provides for uplink of time-tagged commands. Time-tagged commands are commands which are uplinked to one of two queues on the Command and Control MDM, the General Purpose queue (size is 200 commands) or the Communications and Tracking queue (may contain up to 75 commands), for execution at a later time. Selecting **Uplink Time-Tag Command** from the **Options** menu of the **Command Operation** main window with **Command Inventory** selected and a time-tagged command highlighted invokes the **Uplink Time-Tag Command** dialog box (see Figure 3-3. Uplink Time-Tag Command Dialog Box).

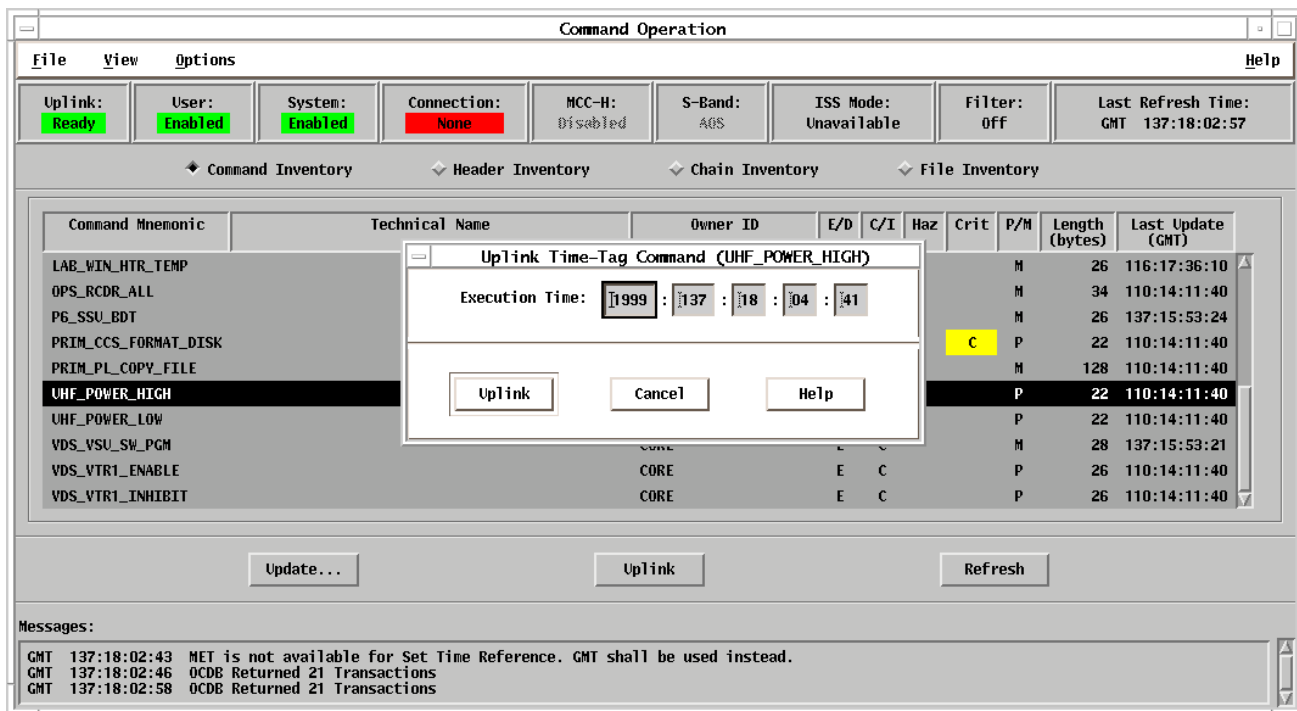


Figure 3-3. Uplink Time-Tag Command Dialog Box

The **Uplink Time-Tag Command** dialog box contains a text entry field for the intended **Execution Time**: onboard the ISS. The Central Command Processor verifies the following:

- execution time is not in the past
- execution time is not beyond 336 hours in the future
- execution time specified does not match that of a previously uplinked time-tagged command to that particular queue

Delete from Drop Box

The **Delete from Drop Box** option from the **Options** menu of the **Command Operation** main window invokes the **Delete from Drop Box** dialog box (see Figure 3-4. Delete from Drop Box (Confirmation Required) Dialog Box) when **File Inventory** is selected. The Drop Box serves as a quarantine area (files checked for viruses) for external files being transferred into or out of the EHS firewall. The Delete from Dropbox function provides the following:

- Allows a privileged user to remove a document from the file inventory in a single action
- Allows a privileged user to remove a component file from the file inventory
- Resets the “at MCC-H indicator” in PIMS for the selected document or component file

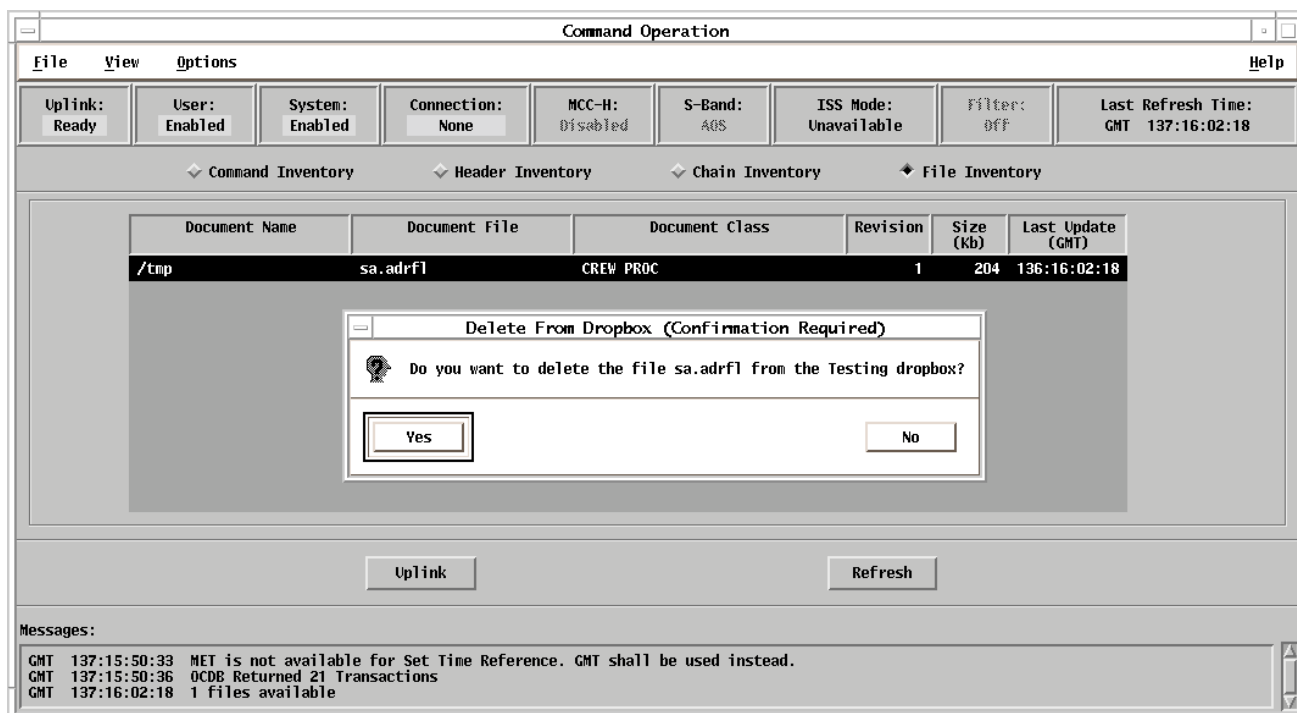


Figure 3-4. Delete from Drop Box (Confirmation Required) Dialog Box

Stop File

As it's title implies, the **Stop File** option provides the capability to terminate the uplink of a command file. When invoked the dialog box will present one of two messages:

Do you want to stop the file: <filename> from uplinking?

OR

A file is not currently being uplinked.

Configure Command System

The Configure Command System dialog box provides you with information regarding the current status of the commanding system and shows the project-specific aspects of commanding which apply to everyone with commanding privileges. These options can only be changed by the Integrated Support Team (IST) or Command System Managers. The **Retry** frame includes user-defined fields used to specify the number of **User Retries:** allowed and to enable/disable the **Retry Prompt:**.

If CAR, FSV, or CRR processing is enabled and you uplink a command and don't receive confirmation that the command was sent successfully, then the **Maximum Retries:** field identifies how many times the system will permit you to resend the command. In the **User Retries:** field you can define for yourself

and your workstation the number of retries you want, up to the maximum. If you try to enter a number higher than the maximum, you'll get an error message. The **Retry Prompt:** allows you to resend failed uplinks after the system has performed the number of **User Retries:** selected.

Note: If you wish to change information on this dialog box, other than information contained in the **Retry** frame, you should contact the Command System Manager on the voice loop.

Process GSE File

Ground Support Equipment (GSE) files contain updates to data sets, commands, and groups stored in the OCDB. Once a user has downloaded the GSE file onto his local workstation he/she can select that file for GSE file processing by using the **Process GSE File** dialog box (see Figure 3-5. Process GSE File Dialog Box). Once a file has been selected for processing, the background process activated by the dialog box will read the file and make updates to the commands, data sets, and groups as specified by the directives in the file. All errors encountered by the background process will be displayed to the user in the message area of the dialog box. Note that the Command Operation application can not be dismissed while the GSE background process is processing a file.

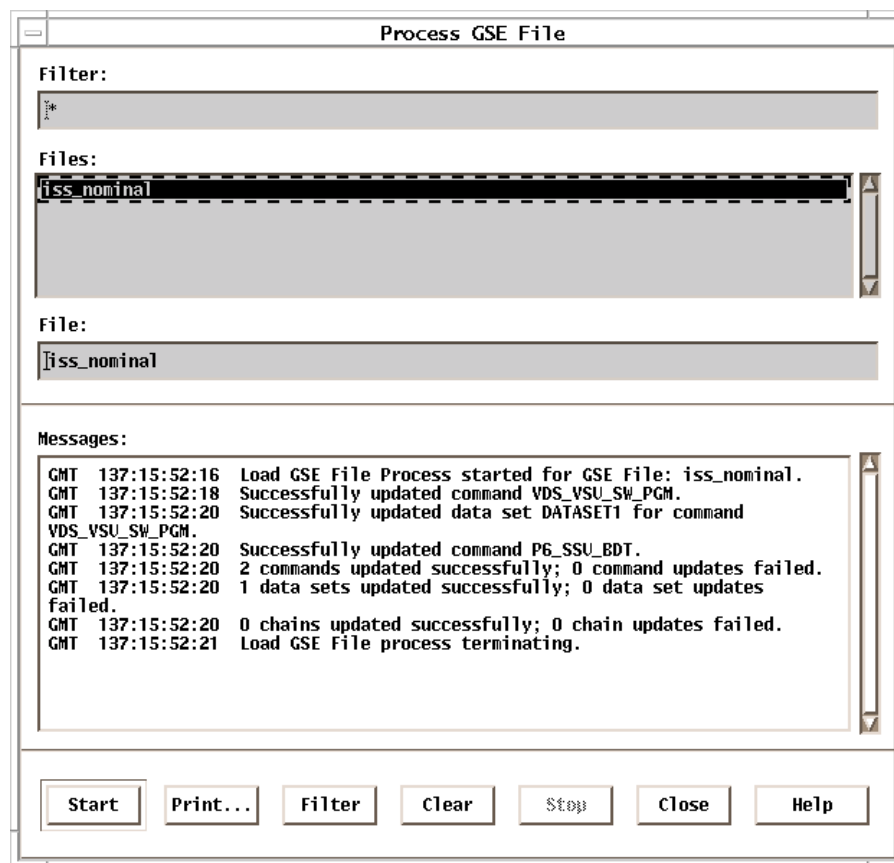






Figure 3-5. Process GSE File Dialog Box

Command Summary

The Command Summary dialog box allows you to generate a report summarizing command activity over a specified time period. Once generated, this summary may be printed or exported to an ASCII text file. This ASCII text file can then be opened in FrameMaker (under “doc/” directory) where it can be edited.

Export a Report to an ASCII File:

Note: The **Filter:** input text field on the **Export Report** dialog box contains the asterisk wildcard which results in all reports being shown in the **Files:** area. To narrow this list you can specify the filename filtering criteria and click , or press  to initiate the  function.  is the default pushbutton action when the cursor is in the **Filter:** input text field.

1. In the **Files:** area, you can select a report in which the file will be exported by:





- Clicking once on the filename within the **Files:** area

OR

- Typing a filename in the **Export to Text File:** input text field

2. Click .


Once the ASCII file has been exported, it can then be opened in FrameMaker.

1. From the **Launchpad**, **Utilities** menu, select **FrameMaker**.
2. From the **FrameMaker** main window select **Open**. The **FrameMaker - Open** dialog box will be invoked.
3. Scroll down the list of directories until you reach the “**doc/**” directory, select it and click .
4. From the list of files, select the ASCII file and click .
5. Select “**Text**” from the **FrameMaker - Unknown File Type** dialog box and click .
6. Select the “**Treat Each Line As a Paragraph**” radio button on the **FrameMaker - Reading Text File** dialog box and click .
7. You will be presented with an editable copy of the Command Summary.

Find Mnemonic

The **F**ind option from the **Command Operations, Options** menu, allows you to perform a search based on your inventory radio button selection. Depending on your inventory, the menu item will change and the dialog box invoked will change. This find function is not case-sensitive. No wildcards are permitted and the found command, group, etc. will be highlighted within the inventory list.

Search for a Command Mnemonic, Group Name, or File Name:

1. Select **F**ind Mnemonic..., **F**ind Group Name..., or **F**ind File Name... from the **O**ptions menu.
2. Click in the input field below the **Find Mnemonic:** label and type the mnemonic, group name, chain, or file name that you want to find.
3. Click on .

Command Track

The Command Track application supports the real-time tracking of commands, groups, and files as they are uplinked by the command system to the spacecraft. The work area is updated each time an uplink transmission is issued from the Huntsville Operations Support Center (HOSC). All responses that correspond to each uplink are also displayed. You can configure the display to show data for all HOSC command users in a mission or for your User ID only.

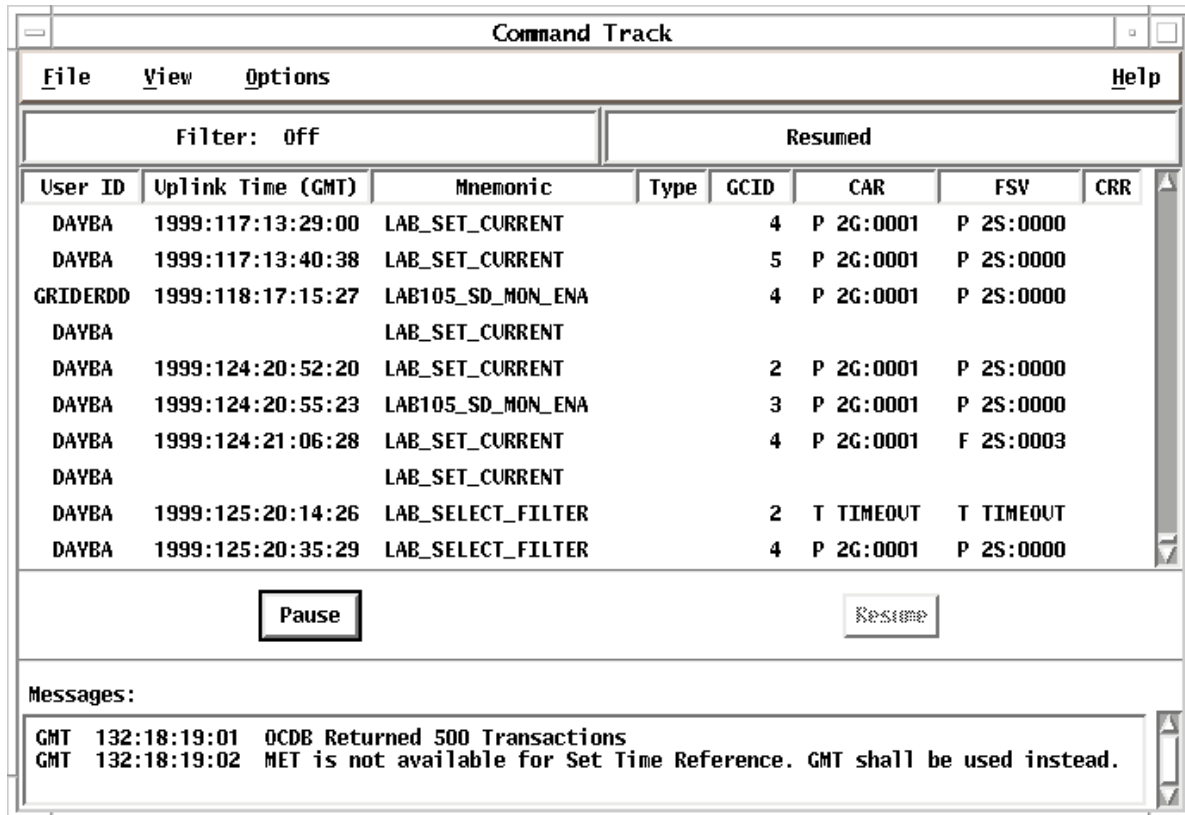


Figure 3-6. Command Track Main Window

The work area (see Figure 3-6. Command Track Main Window) displays commands sent from the HOSC and their associated data. When the Command Track application is initiated, the last 500 commands sent are listed in this window. If less than 500 commands have been transmitted, only those that have been sent will be listed. The most recent commands will appear at the bottom of the list. Use the vertical scroll bar at the right-hand side of the main window to scroll through the commands in the list. If scrolling back through a large number of commands use the **Pause** pushbutton on the Control Panel. Otherwise, the next uplink will cause Command Track to scroll to the bottom of the display.

The Command Track report will generically display the following information:




- User ID
- Command mnemonic to command load block reference; when a command load is uplinked, only the first command of that load will appear in the Command Track report.
- Uplink time
- Ground Coordination ID (GCID) value
- CAR pass/fail status
- FSV pass/fail value
- CRR pass/fail status


Exercises

Instructions

The following “Try It” directs you through the **Command Operation** application as it relates to the processing of a single command. Carefully read and complete each step.

Try It...

1. From the launchpad **Operations** menu, select **Command Operations**.
2. From the Inventory radio buttons on the **Command Operation** main window select **Command Inventory**.
3. From the **View** menu of the **Command Operation** menu bar select the **Arrange Columns...** option.
4. Select an item from the **Columns:** list.
5. Click on the **Shuttle**  or  to rearrange the order of the selected column.
6. Repeat steps 4 and 5 until the columns are in the desired order.
7. Click on .
8. From the **View** menu of the **Command Operation** menu bar select the **Filter...** option.
9. Enter a combination of letters and wildcard characters into the text input fields for **Owner ID Filter:**, **Mnemonic Filter:**, or **Technical Name Filter:**. Click on the appropriate radio buttons, and specify a particular time range.

10. When the filtering criteria have been appropriately identified, click . The results of the filtering process are displayed in the **Command Operations** main window.

11. From the **View** menu of the **Command Operation** menu bar select the **Sort...** option.

12. Select an item from the **Inventory Columns:** list and click on  **Add**.

Tip: You can also double-click to automatically add the element to the **Sort Order:** list.

13. Remove items from the **Sort Order:** list by clicking  **Remove**.


14. Repeat steps 12 and 13 until all desired items are added to the **Sort Order:** list.

15. Arrange the items in the **Sort Order:** list by sort priority using the **Shuttle** buttons. Click on the **Shuttle**  or  to move a selected item up or down in priority.

16. As you select each item in the **Sort Order:** list, ensure that the appropriate radio button specifying sort direction is selected, either **Ascending** or **Descending**.

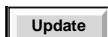
17. Repeat steps 15 and 16 until the columns are in the desired sort order and that each item is expected to sort in the desired direction.


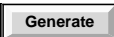

18. Click on .

19. Select a modifiable command from the work area that you have previously saved to your workstation. Click .

20. The **Update Command** mini-application will be invoked containing the contents of the selected command in the **Update Command** frame of the main window.


21. If you wish to edit the contents of the command's modifiable fields, you may do so by making your changes within the text entry fields of the **Update Command** frame.


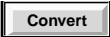

22. When satisfied with your changes, click . Results of the update will be listed in the **Messages:** area.

23. From the **Update Command** menu bar, **Data Set** menu select the **Close** option. You will be returned to the **Command Operation** main window.
24. Select the command mnemonic that you wish to uplink from the list presented in the **Command Operation** main window.
25. Check the Status Bar of the **Command Operations** main window to ensure that the **System:** and **User:** fields display “Enabled” and that **Uplink:** displays “Ready”.
26. Click . Status of the uplinked command will be displayed in the **Messages:** area.
27. From the Options menu of the Command Operation menu bar select the **Command Summary...** option.
28. The **Generate Command Summary** dialog box will be invoked.
29. Enter the **Start/Stop GMT:** times. The **Start GMT:** defaults to the current time minus 1 hour. The **Stop GMT:** defaults to the current time. The **Start/Stop GMT:** times may be changed, from the defaults, to reflect operational requirements. The **Delta** time will represent the time interval between start and stop times, expressed in hours and minutes.
30. Click . The Command Summary will be displayed in the **Summary:** frame of the **Generate Command Summary** dialog box.
31. Export this summary to an ASCII text file by clicking . The **Export Report** dialog box will be invoked.
32. In the Files: area select a report in which the file will be exported by: Clicking once on the filename within the **Files:** area

OR

Typing a filename in the **Export to Text File:** text entry field.

33. Click .
34. From the **Launchpad**, **Utilities** menu, select **FrameMaker**.
35. From the **FrameMaker** main window select **Open**. The **FrameMaker - Open** dialog box will be invoked.
36. Scroll down the list of directories until you reach the “**doc/**” directory, double-click on the directory.

37. From the list of files, select the Command Summary from step 32 and click .
38. Select “**Text**” from the **FrameMaker - Unknown File Type** dialog box and click .
39. Select the “**Treat Each Line As a Paragraph**” radio button on the **FrameMaker - Reading Text File** dialog box and click .
40. You will be presented with an editable copy of the Command Summary.
41. From the Launchpad, **Operation** menu, select the **Command Track** menu option.
42. The **Command Track** main window will be invoked, displaying up to the last 500 commands sent.
43. To close the **Command Track** main window, select **Exit...** from the **File** menu.

Command Group Operations

***Note:** Command Groups will not be implemented until Build 4.2. The following information is based on previous builds of the software and should not be considered accurate. Since this software is in the development stage the following information may or may not be reflected in the final Build 4.2 software release.*

A command group is a list of sequenced commands which are intended for uplink in response to a single user request. While the basic mechanics of sending commands remain unchanged from those involved with single command transmissions, there are distinctions to be made in consideration of group commands. The following sections of this module will concentrate on those aspects of Command Operations that apply specifically to command groups.

Group Inventory

The **Group Inventory** is obtained by selecting the appropriate inventory selection radio button on the Command Operation main window. A command group is a sequenced list of commands that a user is capable of uplinking using a single uplink request. Command groups are defined by the following attributes:

- command groups can have many commands packaged in one transmission
- command groups cannot include hazardous commands
- a single, modifiable command can be included many times in a command group, with each occurrence containing a different set of modifiable data
- you can create and store locally many command groups
- Command groups may be created as needed using the Command Operation application

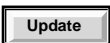
Command Group Generation/Update Command Group mini-application

If you have the command **Group Inventory** displayed, and a group is selected, the **Update...** menu item invokes the Update Command Group mini-application. This application is identical to the Command Group Generation application available off the **Launchpad** except that Update Command Group mini-application makes no provisions for:

- defining a new group
- specifying a group to open
- saving a group with another name.

Note: If you want to create a new command group, you must go through the Command Group Generation application. The Update Command Group mini-application only allows you to modify the selected existing command group. **New**, **Open**, and **Save As** functions are not provided in the Update Command Group mini-application. The Command Group Generation application permits users to build groups without being privileged to uplink them.

The Command Group Generation application allows you to build, update, and save command group definitions. The Update Command Group mini-application, invoked from Command Operation, allows you to update and save the selected command group which can then be uplinked through the Command Operation application. Both the Command Group Generation and the Update Command Group mini-application utilize the Update Command mini-application to define data for modifiable commands in a group. The Command Group Generation application is accessed through the **Launchpad**, whereas the Update Command Group mini-application is accessed through:



-  in Command Operation
- a Scratchpad Line (SPL) directive in the Scratchpad Line application
- a SPL directive in the Display Operation application



Exercises

Instructions





The following “Try It” directs you through the process of creating a new group command using the Command Group Generation application. Carefully read and complete each step.

Try It...




1. From the Launchpad, **Generation** menu, select **Command Group Generation**.
2. The **Command Group Generation** main window will be invoked.
3. Select commands from the **Command Inventory** column, using  **Add** or  **Add & Update** to include the selected mnemonics in the **Group Definition** column.

Note:  **Add** adds the command to the group without data, unless the command is predefined, in which case, it's defined data is used.  **Add & Update** allows you to invoke the **Update Command** mini-application and update the command data before adding it to the group.

Note: In order to modify any command data, the Command Update form for that command must have previously been saved to your workstation.

4. Further define the **Group Definition** by using the **Shuttle**  or  to change a command's position in the group.
5. Click  to remove individual commands from the **Group Definition**.
6. Click  to invoke the **Update Command** mini-application to modify the command data for individual commands.

Note: In order to modify any command data, the Command Update form for that command must have previously been saved to your workstation.

7. Select the **Save As** option from the **Group Generation, File** menu and supply a title for this group in the **Save:** text entry field. Click .
8. From the **Command Group Generation** menu bar select **Validate**.
9. The **Validate** dialog box will be invoked.
10. Click . The header and commands within the command group will be validated against the command database as specified in the **Valid for Versions:** frame with the results of the validation listed in the **Messages:** frame.
11. Click .
12. From the **Command Group Generation** menu bar, **File** menu, select **Exit...**

Validate

Regardless of whether you are in the Command Group Generation or Update Command Group mini-application, the menu item available under the **Validate** menu allows you to check the header and commands within command groups against an available Command Database (CDB).

Since command groups are built using commands from the Operational Command Database (OCDB), command groups, at the time they are built, are valid. Command groups however, are maintained outside the OCDB and therefore, must be validated each time a new Project Command Database (PCDB) is baselined. The validation function verifies that the commands in a group are defined in the PCDB and are accessible to the user.

CAUTION: Groups may be valid against a database and not be complete. This means that groups that have been validated may still not be ready for uplink.

Note: To determine if an individual command is complete/incomplete, reference the Group Inventory Work area (see Figure 3-7. Group Command Status)

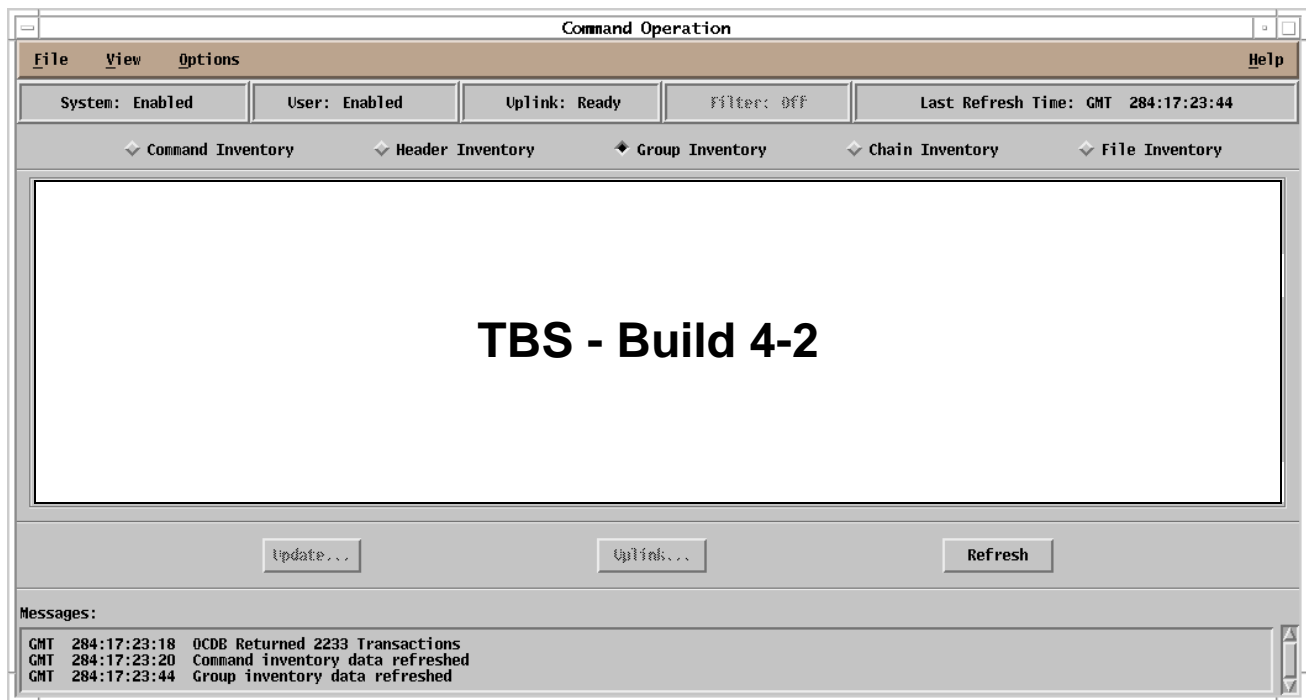


Figure 3-7. Group Command Status

Note: The **Validate** dialog box opens with the results of the last validation process displayed. This allows you to start the validation process, close the dialog box, and later to reopen it to view the results in the message area.

The database versions against which this particular command group has already been successfully validated will be displayed in the **Valid for Versions:** area of the **Validate** dialog box. By looking at this section of the dialog box you can quickly identify whether or not this command group has already been validated against a particular database.

In the **Command Database** area of the **Validate** dialog box, you can select whether to validate this command group against a particular PCDB. The revision number of each of the available databases is shown. Clicking on the desired database will activate the selection.

The results of the validation process are posted in the message area of the **Validate** dialog box.

Uplink Group

If the **Group Inventory** is displayed and a group is selected, the **Options** menu displays an **Uplink...** menu item. Clicking **Uplink...** results in a **Control Uplink** dialog box being opened from which you can initiate the uplink process.

Control Group Uplink

This dialog box consists of a group contents table that allows you to look at information relative to the individual commands that comprise the group. From this table, you may also choose to uplink the group starting at a specific position other than 0. The commands are listed in their uplink order and information displayed on each command includes:

- the command's relative position within the group (**Pos**). A **0** in this column indicates that this is the first command in the group
- the command's mnemonic (**Command Mnemonic**)
- the command's enable (**E**) disable / (**D**) status
- an indication of whether the command is critical (**Crit**). The background of a critical command is shown in yellow. A blank is shown if the command is non-critical.
- the uplink data for each command is shown in hexadecimal in the column labeled **Uplink Data (hex)**

The **Blocking Factor** is provided by the command system. It shows how many commands will be packed into a single NASA Communications (NASCOM) block. This number is project-dependent and may be set by the Command System Manager. To change this value contact the Commands System Manager on the voice loop.

Once initiated the group is uplinked beginning with the selected command and then continues through the group one command at a time. As each command is uplinked, the next one becomes selected for uplink. If at any time, the uplink process is stopped, the command currently being processed will be completed prior to stopping the uplink. If you start the uplink again, group processing will start at the selected command.

If you attempt to uplink a command group with a disabled or incomplete command, you'll receive an error message. To enable a disabled command group, contact the Command System Manager via the voice loop. To complete an incomplete command, select the group, initiate the Update function, select the incomplete command and complete all incomplete fields (see Figure 3-7. Group Command Status).







Exercises



Instructions

The following "Try It" directs you through the Command Operation application as it relates to the processing of group commands. Carefully read and complete each step.




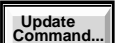
Try It...

1. From the launchpad **Operations** menu, select **Command Operations**.
2. From the Inventory radio buttons on the **Command Operation** main window select **Group Inventory**.
3. From the **View** menu of the **Command Operation** menu bar select the **Arrange Columns...** option.


4. Select an item from the **Columns:** list.
5. Click on the **Shuttle**  or  to rearrange the order of the selected column.
6. Repeat steps 4 and 5 until the columns are in the desired order.
7. Click on .
8. Select a group command from the work area and click .
9. The **Update Command Group** main window will be invoked containing the contents of the selected group command.
10. Select commands from the **Command Inventory** column, using  **Add** or  **Add & Update** to include the selected mnemonics in the **Group Definition** column.







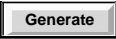
Note:  **Add** adds the command to the group without data, unless the command is predefined, in which case, it's defined data is used.  **Add & Update** allows you to invoke the **Update Command** mini-application and update the command data before adding it to the group.







Note: In order to modify any command data, the Command Update form for that command must have previously been saved to your workstation. You must also exit the Update Command application before the group will reflect the changes.

11. Further define the **Group Definition** by using the **Shuttle**  or  to change a command's position in the group.
12. Click  to remove individual commands from the **Group Definition**.
13. Click  to invoke the **Update Command** mini-application to modify the command data for individual commands.

Note: In order to modify any command data, the Command Update form for that command must have previously been saved to your workstation.

14. Select the **Save As** option from the **Group Generation, File** menu and supply a title for this group in the **Save:** text entry field. Click .

15. From the Update Command Group menu bar, select **Validate**.
 16. The **Validate** dialog box will be invoked.
 17. Click . The header and commands within the command group will be validated against the command database as specified in the **Valid for Versions:** frame with the results of the validation listed in the **Messages:** frame.
 18. Click .
 19. From the **Update Command Group** menu bar, **File** menu, select **Close**.
- Note:** Ensure the group is complete by checking the **I/C** column of the Group Inventory work area in **Command Operation**.
20. On the Command Operation main window, select a command group to be uplinked. Click .
- Note:** You will receive a message in the **Messages:** area of the Command Operations main window stating “Group is not complete” if your group command is not ready for uplink (i.e. modifiable fields do not contain data).
21. The **Control Group Uplink** dialog box will be invoked.
 22. Select the command to be transmitted first (you do not have to begin transmission with Pos 0).
 23. Click  to begin transmission; to stop transmission, click ; to resume transmission again, click  again, transmission will resume at the selected command.
 24. From the Options menu of the Command Operation menu bar select the **Command Summary...** option.
 25. The **Generate Command Summary** dialog box will be invoked.
 26. Enter the **Start/Stop GMT:** times. The **Start GMT:** defaults to the current time minus 1 hour. The **Stop GMT:** defaults to the current time. The **Start/Stop GMT:** times may be changed, from the defaults, to reflect operational requirements. The **Delta** time will represent the time interval between start and stop times, expressed in hours and minutes.
 27. Click . The Command Summary will be displayed in the **Summary:** frame of the **Generate Command Summary** dialog box.

28. Export this summary to an ASCII text file by clicking . The **Export Report** dialog box will be invoked.
29. In the Files: area select a report in which the file will be exported by:
Clicking once on the filename within the **Files:** area
OR
Typing a filename in the **Export to Text File:** text entry field.
30. Click .
31. From the **Launchpad**, **Utilities** menu, select **Framemaker**.
32. From the **FrameMaker** main window select **Open**. The **FrameMaker - Open** dialog box will be invoked.
33. Scroll down the list of directories until you reach the “**doc/**” directory, select it and click .
34. From the list of files, select the Command Summary from step 32 and click .
35. Select “**Text**” from the **FrameMaker - Unknown File Type** dialog box and click .
36. Select the “**Treat Each Line As a Paragraph**” radio button on the **FrameMaker - Reading Text File** dialog box and click .
37. You will be presented with an editable copy of the Command Summary.
38. From the Launchpad, **Operation** menu, select the **Command Track** menu option.
39. The **Command Track** main window will be invoked, displaying up to the last 500 commands sent.
40. To close the **Command Track** main window, select **Exit...** from the **File** menu.

Command File Processing

The process of preparing and transmitting a file to a project spacecraft will be handled in a slightly different fashion than the uplink of a single command or group of commands. Files to be uplinked by a user will not be maintained and configuration controlled in the OCDB. Instead, the files will reside on a platform that is recognized by the command server as being the sole source for uplinkable data files within a particular project. The International Space Station (ISS) project will utilize the PIMS server as the host for all uplinkable files, regardless of type. To view a list of files available for uplink users will view their file inventory from the Command Operation application. The Command Operation application will be configured from the MOP to know the location of the current project's uplink file source.

File Inventory

You may have the ability to uplink files to a spacecraft. These files are not maintained or managed by the OCDB. For International Space Station (ISS) users, uplink files are hosted on the Payload Information Management System (PIMS) server. Regardless of where these command files are stored and managed, selection of the **File Inventory** radio button will result in a list of these files being displayed within the work area of the Command Operation main window.

Uplink File

For a file uplink to the ISS to occur, the file must first be resident on the PIMS server. The PIMS server is the sole source of files uplinked from the EHS to the ISS. The EHS provides for file uplinks to the payload MDM only.

Prior to file uplink, the file intended for uplink must be transferred to Mission Control Center-Houston (MCC-H). This is typically accomplished through the File Ground Management Tool (FGMT), but can be accomplished directly through PIMS. Using the FGMT, the file is extracted from PIMS and placed in a file system outside the EHS firewall (HOSC Drop Box). MCC-H polls the HOSC drop box and transfers files when necessary. After MCC-H transfers a file from the HOSC drop box for uplink, an acknowledgement file is created and placed in the MCC-H drop box for retrieval by PIMS. After PIMS has retrieved the corresponding acknowledgement file, the uplink file is marked with the "staged" indicator (a document is marked with the "staged" indicator if all the component files of the document are individually marked with the "staged" indicator). Users may view all files marked with the "staged" indicator through FGMT and the Command Operation application.

Files are typically uplinked using the FGMT. As a contingency, files may also be uplinked by properly privileged users using the file uplink capability in Command Operation (see Figure 3-8. File Uplink Example). Command Operation checks the user privilege to ensure the user may access the the File Inventory which displays all the files marked with the "staged" indicator in PIMS. Once the privilege is verified, the user may select a component file or document from the inventory and request the selected element to be uplinked. If a document is selected, the individual files that collectively make up the document will also be selected. Requests to uplink documents are broken down into individual uplinks

of component files at this point. The request is sent to the Central Command Processor (CCP) where it is validated upon receipt. Validation includes checking that the Command System is enabled, the connection to MCC-H is active, MCC-H is enabled, and that the requesting user is enabled for commanding. If the uplink request is validated, it is formatted as a file transfer request message and submitted to the command queue. After the file transfer request is transmitted to MCC-H, MCC-H responds with file transfer status messages. Among the file transfer status messages returned from MCC-H are messages indicating when the file transfer request is received (CAR1), when the file uplink is started (CAR2), when the file uplink is complete (FSV1), when the onboard transfer is started (FSV2), and when the onboard file transfer is complete (FSV3). The “staged” indicator in PIMS is reset when FSV3 is received.

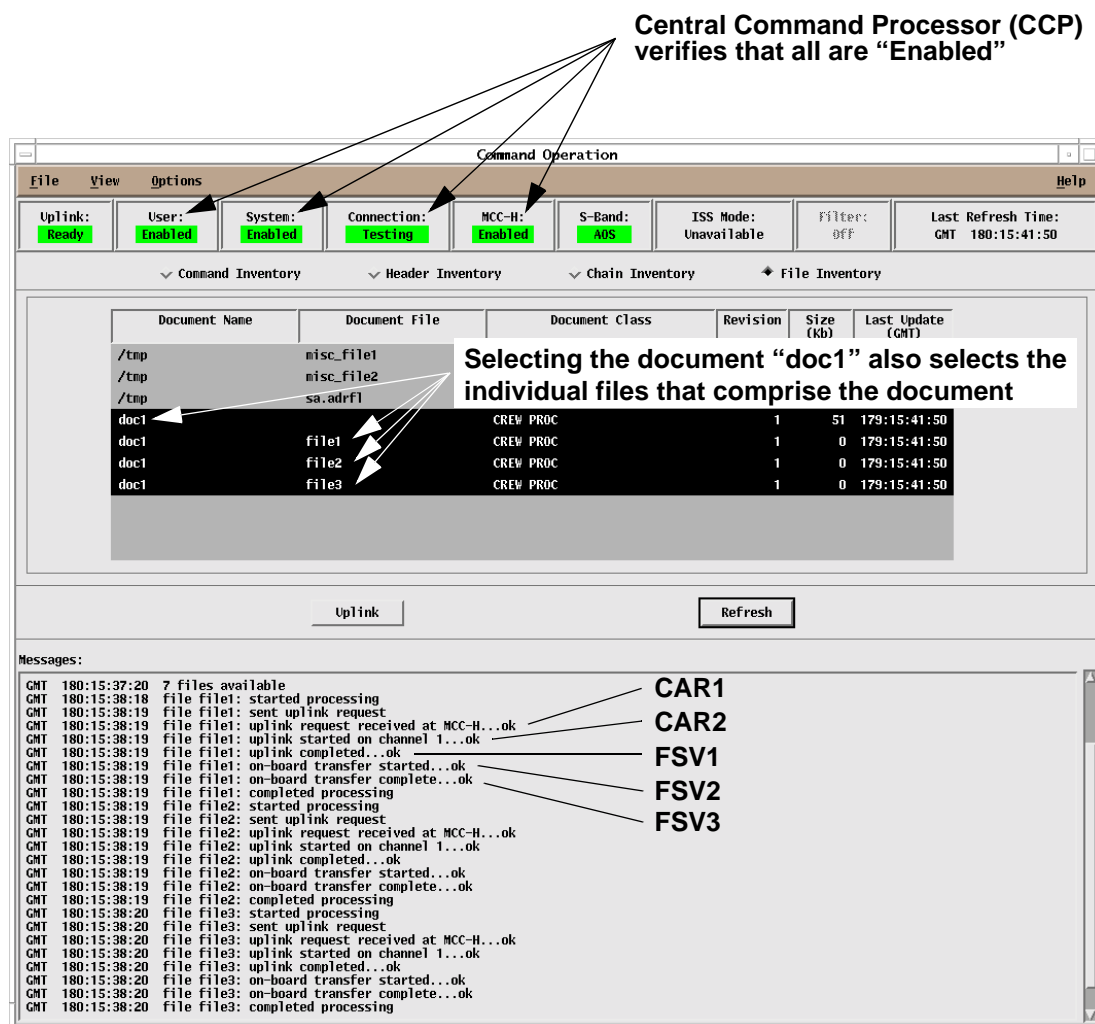


Figure 3-8. File Uplink Example

Once initiated the document is uplinked beginning with the first file in the document and then continues through the document one file at a time. As each file is uplinked, the next one becomes selected for uplink. If at any time, the uplink process is stopped, the file currently being processed will be completed prior to stopping the uplink. If you start the uplink again, file processing will start at the beginning.

Process GSE File

GSE can be any data processing equipment that you've integrated into the HOSC system. You can use this equipment to generate and transfer files to a HOSC workstation, which can then be used to update data sets, commands and groups stored on the OCDB.

First, you must use a file transfer function available off the **Launchpad** under the **Utilities** menu to download a GSE file to your workstation. Next, you use the **Process GSE File** dialog box to select a file and start a background process. This process reads and updates the OCDB with commands and groups as specified in the GSE file. Any errors encountered during processing are displayed in the message area.

The **Process GSE File** dialog box provides the means to search for, select, print, start and stop GSE file processing on your local workstation.

Exercises

Instructions

The following "Try It" directs you through the Command Operation application as it relates to the processing of command files. Carefully read and complete each step.

Try It...

Build 4.1

Summary

In this module the differences between the Command, Header, Group, and File inventories have been illustrated along with the processes involved in the updating and uplinking of commands. The following three application and two mini-applications were discussed:

- Command Operation
- Command Group Generation
- Command Track
- Update Command Mini-application
- Update Command Group Mini-application

The completion of this module concluded our discussion of End-User Command Applications and began our discussion of Command Utilities software with the Command Track application.

With the conclusion of this module you should be able to:

- demonstrate the processes necessary to select, update, and uplink a command
- demonstrate the processes necessary to select, update, and uplink a group
- demonstrate the processes necessary to select, and uplink a file

Questions

Instructions

Indicate the answers for each question below. The correct answers are given immediately following in the **Answers** section.

1. True or False. Inventory configurations implemented through sort, filter, etc. are not saved when you exit the application.
2. The Command Operation application provides two very basic functions, what are they?
 - a. _____

 - b. _____

3. Using the Command Operation, File Inventory you can _____ files but cannot _____ them.
4. Which functions are not available in the Update Command Group mini-application as compared to the Command Group Generation application?
 - a. _____
 - b. _____
 - c. _____
5. Command data sets are accessible for viewing and modification through what application?

Answers

1. **True.** Inventory configurations implemented through sort, filter, etc. are not saved when you exit the application.
2. The Command Operation application provides two very basic functions, what are they?
 - a. provide current status of command subsystem
 - b. support the real-time uplinking of commands, command chains, command groups, and files to the spacecraft.
3. Using the Command Operation, File Inventory you can **uplink** files but cannot **modify** them.
4. Which functions are not available in the Update Command Group mini-application as compared to the Command Group Generation application?
 - a. **New** or define a new group
 - b. **Open** or specify a group to open
 - c. **Save As** or save a group with another name
5. Command data sets are accessible for viewing and modification through what application?

Update Command mini-application, **Data Set** menu item

Module 4

Command Delog

Objectives

Where as Command Track provides you with a look at current commanding activities in a real-time fashion, Command Delog reports will provide you with a look at past commanding activities recorded in the command log maintained by the Command Subsystem. In this module you will learn:

- how to sort a report based on report selection criteria
- how to generate a report based on your report selection criteria

Command Delog Application

The Command Delog application provides you with the capability to view a list of past commanding activities that occurred within a specified time frame. The privilege required for you to access Command Delog is independent of the privilege required to access other commanding applications. Users can generate a command delog report by specifying a time frame for which they wish to view all logged commanding activities for a particular project. Any individual command uplinked to the ISS spacecraft is recorded as an entry in the Space Station command log. Each log entry includes, at a minimum, the following information (see Figure 4-1. Command Delog Main Window):

- the command mnemonic as accessed in the OCDB
- the time the command was uplinked
- the user identification of the user uplinking the command
- the owner identification of the owner of the command
- the source of the command (initiation from Command Operation, Command System Management, Display Operation, File Ground Management Tool (FGMT), script initiation, or scratchpad initiation)
- the intermediate destination of the command
- the Source and Destination LDP (Logical Data Path) of the command
- the binary data that comprises the command structure (displayed by the command delog in hexadecimal format)
- the subsystem type of the command (core or payload)
- the Packet ID, Packet type, and APID associated with the command
- a retransmission indicator
- all command responses received as a result of the command's initiation
- the receipt time for all responses

In addition to the delog information maintained for individual commands, delog information for file transfer requests include:

- the file name
- the file revision
- the onboard file directory path
- the file transfer type (uplink or downlink)

Command Delog

File Edit Options Help

Mnemonic: File: User ID: Source:

Chain Name: Owner ID: Destination:

APID: LDP:

Subsystem Type

- Core
- Payload
- Either

Packet Type

- System
- Payload
- Data Load
- Either

Transfer Type

- Realtime
- Time-Tagged
- File Uplink
- File Downlink
- Either

Time-Tagged

- Time-Tagged
- Not Time-Tagged
- Either

CAR

- Pass
- Fail
- Null
- Either

FSV

- Pass
- Fail
- Null
- Either

CRR

- Pass
- Fail
- Null
- Either

Critical

- Critical
- Non-Critical
- Either

Hazardous

- Hazardous
- Non-Hazardous
- Either

Uplink GMT

Start GMT

- Start of Log
- User Input GMT 1999 : 136 : 12 : 43 : 56

Stop GMT

- End of Log
- User Input GMT 1999 : 137 : 12 : 43 : 56

Define Report Sort Criteria... Generate Report... Reset

Successfully connected to ISS 0CDB database.
Count: *0 <Insert>

Figure 4-1. Command Delog Main Window

Define Report Sort Criteria

Selecting the **Define Report Sort Criteria** menu item from the **Command Delog** main window, **Options** menu, invokes the **Define Report Sort Criteria** dialog box. This dialog box allows you to select the criteria by which the report will be sorted and the order of sorting priority. You may sort the Command Delog report by (see Figure 4-2. Define Report Sort Criteria Dialog Box):

- mnemonic
- owner identification (ID)
- uplink Greenwich Mean Time (GMT)
- user ID

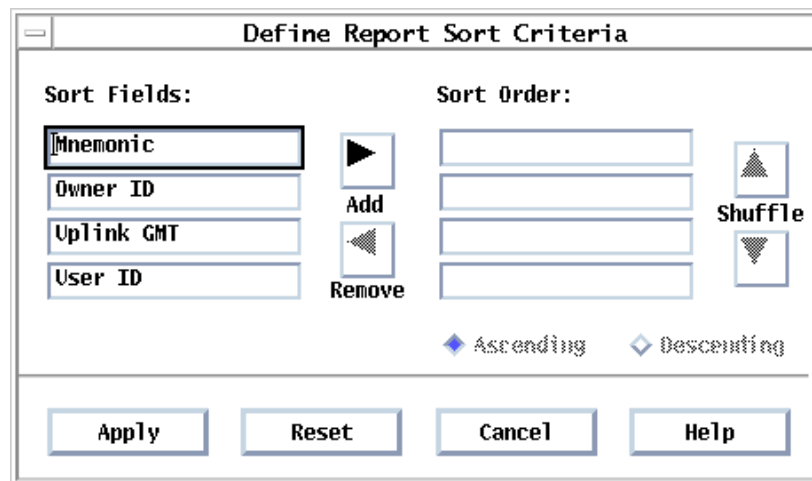






Figure 4-2. Define Report Sort Criteria Dialog Box

Specify a Sort Criteria for a Command Delog Report:


1. Select a sort criteria you wish to apply to the Command Delog report by clicking the appropriate item in the **Sort Fields:** list. Then click  **Add** to include the item in the **Sort Order:** list. Continue this step until you have added each desired sorting criteria to the **Sort Order:** list.
2. If you decide not to sort the Command Delog report by a criteria you have already added to the **Sort Order:** list, click on the unwanted item and then click  **Remove**.
3. If you wish to rearrange the order of the sort criteria listed in the **Sort Order:** list, select the item you wish to move by clicking on it. Swap the item with the item above or below it, by clicking either  or .
4. To select whether an item in the **Sort Order:** list is to be sorted in an ascending or descending order, select the item and then click on either the **Ascending** or **Descending** radio button. Each sorting criteria can have its own unique sort order. The sort order will be specified by an **A** or **D** which is appended to the sort criteria item (e.g., **Mnemonic (A)** indicates that the **Mnemonic** column is sorted in ascending order from A-Z).

Exercises

Instructions

The following “Try It” directs you through the process of generating a command delog report. Carefully read and complete each step.

Try It...

1. If you wish to generate a report on a specific command, click in the **Mnemonic:** field and enter the mnemonic of that command.
2. To generate a report on all commands issued by a particular user, click in the **User ID:** field and enter the user ID of the desired user.
3. If you wish to generate a report on a specific group, click in the **Group Name:** field and enter the name of the desired chain. (**Build 4.2**)
4. To generate a report of commands issued by a specific owner, click in the **Owner ID:** field and enter the owner ID of the desired owner.
5. Click on the **Source:** option menu button to select the source (Command Operation, Display Operation, Scratchpad Line or Script Operation).
6. Click in the **Destination:** field to enter the 2-digit hexadecimal destination code.
7. Set the filtering criteria for **CAR**, **FSV**, **CRR**, **Critical** and **Hazardous**. These radio button boxes are set by default to **Either**.
8. The **Uplink GMT** default is set to **User Input GMT**. If you wish to generate a report with time limits, click in the fields in the **Start GMT** and **Stop GMT** boxes and enter, from left to right:
 - Year (in four-digit format, e.g., 1996)
 - Julian date
 - Hour
 - Minutes
 - Seconds
9. To generate a report from the beginning of the log, select **Start of Log** in the **Start GMT** box. To generate a report to the end of the log, select **End of Log** in the **Stop GMT** box.
10. Click .

Generate ASCII Report

You can also generate an ASCII Report by selecting **Generate ASCII Report...** option from the **Options** menu of the **Command Delog** main window. The **Generate ASCII Report...** menu item invokes a dialog box (see Figure 4-3. Generate ASCII Report Dialog Box) that allows you to provide an ASCII filename in which to save your report. The file will be stored in your.doc directory which can be subsequently opened in FrameMaker available under the **Utilities** menu.

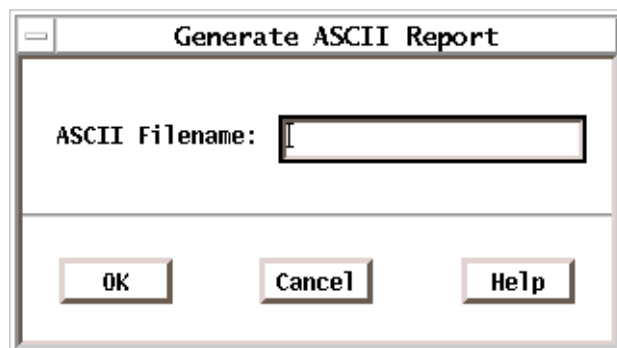


Figure 4-3. Generate ASCII Report Dialog Box

Summary

The Command Delog Application generates a list of past commanding activities that occurred within a specified time frame. Along with the standard menu selections (Exit, Cut, Copy, Paste, Clear, Generate Report, and Generate ASCII report) you are provided the capability to define a sort criteria for your report.

With the conclusion of this module you should be able to:

- demonstrate how to sort a report bases on report selection criteria
- generate a report based on your report selection criteria

Questions

Instructions

Indicate the answers for each question below. The correct answers are given immediately following in the **Answers** section.

1. How does the Command Delog application differ from the Command Track application?

2. List the elements that a Command Delog Report may be sorted by.

- a. _____
- b. _____
- c. _____
- d. _____

Answers

1. How does the Command Delog application differ from the Command Track application?

Command Delog provides a list of past command activities for a specified period of time. Command Track provides a list of up to 500 of the most current real-time commands.

2. List the elements that a Command Delog Report may be sorted by.

- a. mnemonic
- b. owner ID
- c. uplink GMT
- d. user ID

Module 5

Command History

Objectives

The Command History application provides you with the capability to view, print, and save a Command History file. In this module you will learn the terms necessary to interpret the information presented in a Command History Report.

Overview

A Command History Report originates at an intermediate facility (MCC or CCC located at JSC, for example) and provides the EHS user with a comprehensive listing of the last 75 payload command events or activities received for uplink at the intermediate facility and sent to the project spacecraft. The reports will be used for command transmission accountability and trouble-shooting between the HOSC and intermediate facility. Reports will be generated by the intermediate facility and transmitted to the HOSC upon voice request by a command system manager. The format and contents of the Command History report is determined by the intermediate facility. When the Command History Report is received at the HOSC, the Command Subsystem will place the data in a reserved file and directory on the command server. Each time a new Command History report is received, the old Command History report is overwritten.

After you have retrieved and viewed the Command History report, you can export the generated report to an ASCII text file, which can then be imported into FrameMaker where it can be edited.

Space Station Command History Report

Note: For Space Station no requirement currently exists for the Command History application. It is anticipated that if and when a requirement is developed, it will be included in the Build 5.0 software release.

The command history for Space Station is maintained in a file archive at MCC-H. This archive is maintained in an ASCII text format. The archive is continually appended to for each command uplink. EHS obtains history reports by requesting a specific time slice from within this archive. The EHS request for Space Station Command History Report will be serviced by the history file being transferred to the EHS.

MCC Command History

For Spacelab supports, the MCC Command History will be a summary of the last 75 payload command activities received for uplink at the MCC. The MCC Command History report consists of thirteen columns:

- GMT
- CON SRC
- STA
- ORB/CMPT
- P/L VEH
- CMD NR
- 1 or 2
- NR WD
- FUNC
- AR M
- POC CAP
- MCC COMP
- MCC NDX

GMT

The **GMT** (Greenwich Mean Time) column contains the time that the command was transmitted from MCC to the spacecraft (in GMT format).

Console Source (CON SRC)

The **CON SRC** column contains the site where the command originated (e.g., Marshall Space Flight Center (MSFC), Goddard Space Flight Center (GSFC)).

Station ID (STA)

The **STA** column contains a four-character field identifying the uplink station identification (ID). If no uplink ID exists, the column remains blank.

Orbiter/Computer (ORB/CMPT)

The **ORB/CMPT** column contains a single character indicating which on-board General Purpose Computer (GPC) equipment to which the command was uplinked. For example, an uplink to GPC1 would be indicated by the character **1**.

Payload Vehicle (P/L VEH)

The **P/L VEH** column contains the three-digit decimal payload vehicle ID.

Command Number (CMD NR)

The **CMD NR** contains a three-digit command number corresponding to the number generated by the HOSC to track that command. It may also contain a four-digit Mission Operations Computer (MOC) function number. This number is generated at Johnson Space Center (JSC).

1 or 2

The **1/2** column indicates the orbiter uplink mode to be either single-stage (1) or two-stage (2).

A single-stage command uplink involves a single validation prior to uplinking to the GPC. When a single-stage command is received by the orbiter, the GPC immediately routes the command to its destination without further validation.

A two-stage command uplink involves further validation of the command after it reaches the orbiter. The command is stored in a buffer and is downlinked to the MCC for comparison to the original message. The results of the comparison are then transmitted to the HOSC and appropriate action is taken. In the event of a successful comparison, the MCC sends a Buffer Compare Status Command Acceptance Pattern (CAP) (*Compare*) to the HOSC. Otherwise, a *No Compare* CAP is sent and the command uplink process is restarted.

Number Words (NR WD)

The **NR WD** column contains the number of 16-bit command words in the input HOSC command block. The command block can contain up to 64 command words.

Function (FUNC)

The **FUNC** column contains the command function. Examples include:

- Uplink Command
- Test
- Terminate
- Buffer Clear
- Buffer Events

Automatic/Manual (AR M)

The **AR M** column indicates whether a two-stage uplink was executed automatically or manually by the MCC. The **AR M** is a one-character field identifying automatic retransmit (**A**) buffer execute mode or manual (**M**) buffer execute mode.

The status of the buffer execute mode is valid only on two-stage command uplinks. Under most circumstances, the MCC automatically uplinks a Buffer Execute command which enables the GPC to route the command from the two-stage buffer to the intended destination. If a manual uplink is desired, the user issuing the command must request this by voice.

POC CAP

The **POC CAP** column is a three-character field that provides the success or rejection of a command that users issued from the facility identified in the **CON SRC** column.

MCC COMP

The **MCC COMP** column contains four characters identifying the results of the MCC two-stage compare results.

MCC Block Index Number (MCC NDX)





The **MCC NDX** column contains a three-character field identifying the decimal MCC command index number of the command output block. This is a number that is assigned by the MOC when the command leaves JSC.

Export Report

The Export Report menu option, available through the Command History File menu, allows you to export the generated report to an ASCII text file. This ASCII file can then be imported into FrameMaker where it can be edited.

Export a Report to an ASCII File:

1. Click on the **File** menu and then click on the **Export Report...** menu item. The **Export Report** dialog box will be invoked with a default export report filename already specified.





Note: The **Filter:** input text field on the **Export Report** dialog box contains the asterisk wildcard which results in all reports being shown in the **Files:** area. To narrow this list you can specify the filename filtering criteria and click , or press  to initiate the  function.  is the default pushbutton action when the cursor is in the **Filter:** input text field.

2. In the **Files:** area, you can select a report in which the file will be exported by:

- Clicking once on the filename within the **Files:** area
- Typing a filename in the **Export to Text File:** input text field

3. Click .

Once the ASCII file has been exported, it can then be opened in FrameMaker.

4. From the **Launchpad**, **Utilities** menu, select **Framemaker**.
5. From the **FrameMaker** main window select **Open**. The **FrameMaker - Open** dialog box will be invoked.
6. Scroll down the list of directories until you reach the “**doc/**” directory, select it and click .
7. From the list of files, select the ASCII file and click .
8. Select “**Text**” from the **FrameMaker - Unknown File Type** dialog box and click .
9. Select the “**Treat Each Line As a Paragraph**” radio button on the **FrameMaker - Reading Text File** dialog box and click .

Summary

The Command History application provides a user the capability to receive a report containing the last 75 instances of command activity with an intermediate facility.

With the conclusion of this module you should be able to:

- interpret the information contained within a Command History report
- identify the steps necessary to import a file into FrameMaker

Questions

Instructions

Indicate the answers for each question below. The correct answers are given immediately following in the **Answers** section.

1. Currently the MCC Command History is a summary of _____

2. Who determines the content and format of the Command History Report?

3. What is the purpose of the Export Report menu option?

Answers

1. Currently the MCC Command History is a summary of **the last 75 payload command activities received for uplink at the MCC.**
2. Who determines the content and format of the Command History Report?

The intermediate facility
3. What is the purpose of the Export Report menu option?

Exports the Command History Report to an ASCII file which can then be imported into FrameMaker where it can be edited.

Module 6

Tying It All Together

Objectives

This module will consolidate the lessons of the previous five modules into one integral exercise.

Overview

We have previously covered, by way of explanation or exercise, the following End-user Command applications (see Figure 6-1. Accomplished Exercises & Applications):

- Command Update Form Generation
- Command Group Generation
- Command System Management
- Command Operation
- Command Track
- Command History
- Command Delog

Up to this point we have regarded each of these subjects as parts of a larger puzzle. It is the purpose of this module to put all the pieces together into one logical picture that clearly depicts the End-user Command applications and the commanding process.

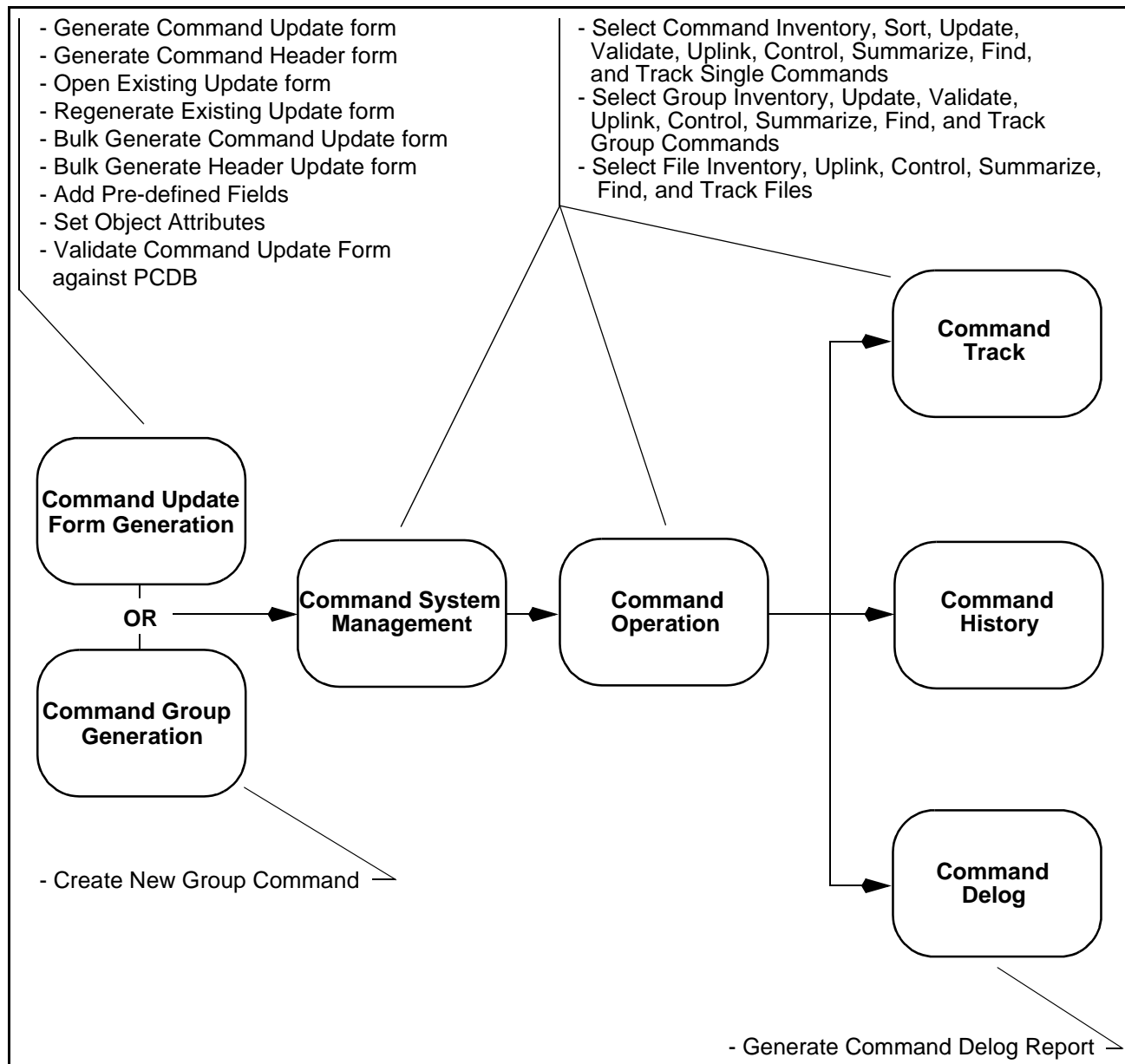


Figure 6-1. Accomplished Exercises & Applications

Exercises

Instructions

The following exercise directs you through the tasks and functions that comprise the End-User Command Applications. Carefully read and complete each step.

Scenario

This exercise is designed to offer the student a review of all the processes used in the End-User Command Applications. It is different from the “Try Its...” presented in the previous modules in that all the step-by-step procedures have been omitted. Given a task (such as “Generate Command Update Form”) the student is left to fend for himself and logically deduce which menu option or application he/she must use to obtain the desired result and then perform those operations. Tasks are listed in sequence so that the current task builds on the results of previous tasks. Choice of command mnemonics are left to the student based on those available on his/her workstation. There are no right or wrong answers, only the procedures used to achieve the completion of the stated tasks. If needed, workbook references are provided as a “nudge” to keep you moving in the right direction.

Try It...

1. Generate Command Update Form (*pg. 2-3*)
2. Generate Header Form (*pg. 2-4*)
3. Bulk Generate Command Update Forms (*pg. 2-6*)
4. Bulk Generate Header Forms (*pg. 2-8*)
5. Add Predefined Fields (*pg. 2-9*)
6. Set Object Attributes (*pg. 2-10*)
7. Regenerate Command Update Forms (*pg. 2-13*)
8. Validate Command Update Forms (*pg. 2-14*)
9. Single Command Processing to include:
 - Sort (*pg. 3-6*)
 - Update (*pg. 3-6*)
 - Uplink (*pg. 3-9*)
 - Summarize (*pg. 3-13*)
 - Command Track (*pg. 3-15*)
10. Generate a Command Group (*pg. 3-20*)
11. Command Group Processing to include:

Update (*pg. 3-25*)

Validate (*pg. 3-26*)

Uplink (*pg. 3-26*)

Summarize (*pg. 3-26*)

Command Track (*pg. 3-27*)

12. Command Delog (*pg. 4-4*)

Summary

This module has presented an exercise designed to integrate the concepts and practices of the preceding modules into a logical whole.

With the conclusion of this module you should be able to:

- generate and manipulate command header and command forms
- update and uplink commands, command groups and command files
- generate as necessary Command Track, Command History and Command Delog reports

Appendix A

Abbreviations and Acronym List

A

a.k.a.	also known as
A/G	Air-to-Ground
A/M	Automatic/Manual
ACBSP	Assembly Contingency Baseband Signal Processor
ADQ	Average Data Quality
ADR	Achievable Data Rate
ADS	Audio Distribution Subsystem
AIS	Automated Information Security
AIT	Analysis Integration Team
AM	Amplitude Modulation
ANSI	American National Standards Institute
AOS	Acquisition of Signal
API	Application Programming Interface
APID	Application Process Identifier
	Application Process Interface Definition
APM	Attached Pressurized Module
APP	Approved
APT	Active Process Table
AR	Action Request

ASCII	American Standard Code for Information Interchange
ASCR	Assured Safe Crew Return
ASI	Agencia Spatiale Italiano
AST	Active Server Table
AT	Address Translation
ATM	Asynchronous Transfer Mode
ATT	Attitude

B

B&D	Boot & Diagnostics
BCD	Binary Coded Decimal
BER	Bit-Error Rate
BFS	Backup Flight System
BG	Bit-contiguous Group
BIA	Bus Interface Adapter
BIT	Built-in Test
BPDU	Bitstream Protocol Data Unit
BPSK	Binary Phase-Shift-Key
BRT	BIT Response Table
BSP	Baseband Signal Processor
BST	BIT Summary Table

C

C&C	Command and Control
-----	---------------------

C&DH	Command and Data Handling
C&T	Communications and Tracking
C&TS	Communications and Tracking System
C&W	Caution and Warning
C	Counter-dependent
C	C Programming Language
CADU	Channel Access Data Unit
CAM	Centrifuge Accomodations Module
CAP	Command Acceptance Pattern
CAR	Command Acceptance Response
CB	Control Bus
CCA	Canadian Space Agency
CCB	Configuration Control Board
CCBD	Configuration Control Board Directive
CCC	Control Center Complex
CCIR	International Radio Consultative Committee
CCP	Central Command Processor
CCR	Configuration Change Request
CCS	Command and Control Software
CCSDS	Consultative Committee for Space Data Systems
CD	Compact Disk
CDB	Command Database
CDD	Command Data Definition

	Context Dependent Decommutation
CDP	Custom Data Packet
CDQ	Current Data Quality
CEU	Control Electronics Unit
CG	Comp Generation
CGM	Computer Graphics Metafile
CHeCS	Crew Health Care Systems
Chk	Check
CI	Configuration Item
CIC	Crew-Interface Console
CLI	Command Line Interface
CM	Configuration Management
CMATS	Configuration Management Asset Tracking System
CMD	Command
CMIP	Common Management Information Protocol
CMIS	Common Management Information System
CNT	Countdown Time
CO	Comp Operation
COF	Columbus Orbital Facility
COR	Communications Outage Recorder
COTS	Commercial-Off-The-Shelf
CPS	Consolidated Planning System Counts Per Second
CPU	Central Processing Unit

CRC	Circular Redundancy Check Cyclic Redundancy Check
CRR	Command Reaction Response
CS	Communications System
CSA	Canadian Space Agency
CSC	Computer Software Component
CSCI	Computer Software Configuration Item
CSM	Command System Management
CSMAC	Communications Status Monitoring and Control
CSO	Computer Security Official
CSOC	Canadian Space Operations Center
CSS	Central Systems Services Command System Services Coarse Sun Sensor
CSU	Computer Software Unit
CUI	Common User Interface
CVCDU	Coded Virtual Channel Data Unit
CVT	Common Value Table Current Value Table

D

dB	Decibels
dBW	Decibels referenced to one Watt
DADS	Data Acquisition and Distribution Services
DAE	Data Acquisition and Extraction

DARL	Database Access Routine Library
DB	Database
DBA	Database Administrator
DBC	Database Coordination Group
DBCR	Database Change Request
DBD	Database Developer
DBMS	Database Management System
DBS	Database Services
DC	Docking Compartment
DCM	Document Configuration Management
DCN	Document Change Notice
DCR	Database Change Request
DCRG	Distributed Control Room Graphics
DCS	Digital Cross-connect Switch
DD AP	Data Distribution Address Processor
DD NS	Data Distribution Network Server
DDQ	Data Data Quality
DDS	Data Distribution System
DDT	Display Data Table
DEMOS	Distributed Earth Model Orbiter Simulation
DES	Data Encryption Standard
DEV	Development
DG	Display Generation
DIST	Distribution

DM	Data Management
DMC	Database Monitor and Control
	Data Management Checklist
DMP	Dump
DoD	Department of Defense
DO	Display Operation
DOCR	Data Operations Control Room
DOSH	Database Operational Support History
DP	Distribute Packet
DPG	Data Packet Generator
DPU	Data Processing Unit
DQ	Data Quality
DQM	Data Quality Monitoring
DRAM	Dynamic Random Access Memory
DRF	Data Requirements Form
DS	Digital Signal
DSM	Docking & Stowage Module
DSID	Data Stream Identifier
DSN	Deep Space Network
DV	Telemetry Display Verify

E

EC	Experiment Computer
ECOMM	Early Communications (S-band)

ECR	Engineering Change Request
ECWA	Emergency, Caution, Warning, and Advisory
EDDS	Enhanced Data Distribution Switch
EDS	EMCS Data System
EEPROM	Electrically Erasable Programmable Read Only Memory
EF	External Facility
EGP	Exterior Gateway Protocol
EGSE	Experiment Ground Support Equipment
EHS	Enhanced HOSC System
EIA	Electronics Industries Association
ELF	Extremely Low Frequency
ELM	Experiment Logistics Module
E&M	Electrical and Mechanical
EM	Exception Monitor
EMCS	Enhanced Mission Communications System
EML	Extract MSID Library
EMU	Extravehicular Mobility Unit
EPS	Encapsulated Postscript
ERIS	EHS Remote Interface Server
ES	Expected State Experiment Section
ESA/APM	European Space Agency/Attached Pressurized Module

ESA/ATV	European Space Agency/Automated Transfer Vehicle
ESA/ERA	European Space Agency/European Robotic Arm
ESC	Engineering Support Center
EVA	Extravehicular Activity
EViDS	Enhanced Video Distribution System
EVoDS	Enhanced Voice Distribution System
EXT FACIL	External Facility

F

FCB	Functional Cargo Block
FDD	Flight Definition Data
FDDI	Fiber Distributed Data Interface
FDF	Flight Dynamics Facility
FEP	Front-End Processor
FEPSC	Front-End Processor Status and Control
FEW	Front End Workstation
FIFO	First-In-First-Out
FMT	File and Memory Transfer
FOV	Field-of-View
FPTNM	Foot-Pounds to Newton-Meters
FSS	Fine Sun Sensor
FSV	Flight System Verifier
FTAM	File Transfer Access and Management
FTP	File Transfer Protocol

G

GB	Gigabyte
GCID	Ground Correlation Identification
GCMR	Ground Control Message Request
GG	Ground to Ground
GHz	Gigahertz
GKS	Graphics Kerning Standard
GMT	Greenwich Mean Time
GNC	Guidance, Navigation, and Control
GOS-2	Grade of Service
GOSIP	Government Open Systems Interconnection Profile
GP	General Purpose
GPC	General Purpose Computer
GPS	Global Positioning System
GPU	General Purpose Utilities CSCI
GR	Ground Receipt
GRT	Ground Receipt Time
GSE	Ground Support Equipment
GSFC	Goddard Space Flight Center
GTC	Ground Testing and Checkout
GTR	Ground Time Reference
GUI	Graphical User Interface

GW	Gateway CSCI
H	
H/W	Hardware
HAMASE	HOSC Automated Model and Screen Editor
HAPS	HOSC Advance Planning System
HASA	HOSC Administrative Software Account
HASS	HOSC Activity Scheduling System
HCR	HOSC Change Request
HDR P/L	High Data Rate Payload
HLOG	HOSC Automated Logging System
HMCG	HOSC Management Coordination Group
HOSC	Huntsville Operations Support Center
HPGL	Hewlett Packard Graphics Language
HPR	HOSC Problem Report
HRDL	High Rate Data Link
HRDS	High Rate Data System
HRF	Human Research Facility
HSM	High Speed Mux
HSMC	Health Status Monitor and Configuration
HSR	HOSC Support Request
HTT	HOSC Training Team
HTTP	Hypertext Transfer Protocol
HTV	HOPE Transfer Vehicle

HUA	HOSC User Assistance
HViDS	HOSC Video Distribution System
HVoDS	HOSC Voice Distribution System
Hz	Hertz (formerly Cycles per Second)
I	
I/O	Input/Output
IAN	Institutional Area Network
ICD	Interface Control Document
ICMP	Internet Control Message Protocol
ICWG	Interface Control Working Group
ID	Identification
IDD	Interface Description Document
IDQ	Instantaneous Data Quality
IEEE	Institute of Electrical and Electronics Engineers
I/F	Interface
IGES	Initial Graphics Exchange Standard
IGSS	International Ground System Specification
IMPS	Interim Mission Planning System
IP	Internet Protocol
IRIG	Interrange Instrumentation Group
IRIG-B	Interrange Instrumentation Group, Standard B
ISCM	Integrated Support Control and Monitoring
ISDN	Integrated Services Digital Network

ISL	Integrated Signal List
ISO	International Organization for Standardization
ISPR	International Standard Payload Rack
ISS	International Space Station
ISSCB	International Space Station Configuration Board
IST	Integrated Support Team
ITS	Integrated Truss Segment

J

JCP	JEM Control Processor
JDK	Java Development Kit
JEM	Japanese Experiment Module
JSC	Johnson Space Center

K

kbps	kilobits per second
kHz	kilohertz
KERMIT	The name of a file transfer protocol
KMTS-A	Kennedy/Marshall Transmission System side A
KMTS-B	Kennedy/Marshall Transmission System side B
KSAF	Ku-band Single Access Forward
KSAR	Ku-band Single Access Return
KSC	Kennedy Space Center

L

LAN	Local Area Network
LDP	Logical Data Path Logical Destination Processor
LDP_ID	Logical Data Path Identifier
LHC	Local Holding Clock
LES	Limit/Expected State Sensing
LOR	Line Outage Recorder
LORSP	Line Outage Recording, Storage, Playback Service
LOS	Loss of Signal
LOV	List of Values
LPS	Launch Processing System
LSB	Least Significant Bit
LSM	Legal Station Mode, Life Support Module Low Speed Mux
LSW	Least Significant Word
LTE	Local Table Edit
LTG	Local Table Generation
LTO	Local Table Operation

M

M	Multi-syllable
Mbps	Megabits per second
M _{max}	Maximum Allowable Downtime

MAS	Media Archive System
MB	Megabyte
MBF	Mission Build Facility
MCC	Mission Control Center
MCC-H	Mission Control Center - Houston
MCC-M	Mission Control Center - Moscow
MCCU	Mission Control Center Upgrade
MDB	Mission Database
MDM	Multiplexer/Demultiplexer
MEC	Medical Equipment Computer
MET	Mission Elapsed Time
MF	Maintenance Fixtures
MH	Message Handler
MHz	Megahertz
MIB	Management Information Base
MIC	Media Interface Connector
MIL-STD	Military-Standard
MIPS	Mission Integrated Planning/Replanning System
MLP	Multi-Line Phone
MMC	(APM) Mission Management Computer
MOC	Mission Operations Computer
MOL	Mission Operations Laboratory
MOP	Mission, Operational Support Mode, and Project
MPLM	Mini Pressurized Logistics Module

MPDU	Multiplexed Protocol Data Unit
MPS	Mission Planning System
ms	Milliseconds
MS	Matrix Switch
MSB	Most Significant Bit
MSFC	Marshall Space Flight Center
MSID	Measurement/Stimulus Identifier
MSL	Microgravity Science Laboratory
MSN	Mission Systems
MSO	Marshall Scheduling Office
MSS	Mission Support Services Mobile Servicing System
MSW	Most Significant Word
MTBF	Mean Time Between Failure
MTTR	Mean Time To Restore
MUPS	Momentum Unloading Propulsion System
N	
NI-DDS	NASA Communications System I Data Distribution System
NII-DDS	NASA Communications System II Data Distribution System
N	Normal
NASA	National Aeronautics and Space Administration
NASCOM	NASA Communications

NASDA	National Space Development Agency of Japan
NCC	Network Control Center
NCS	Node 1 Control Software
NDE	Non-operational Development Environment
NDL	NRT Data Log
NDL	Near Real-Time Data Logger
NEMS	NASA Equipment Management System
NG	Bit Non-contiguous Group
NGT	NASA Ground Terminal
NI	NASCOM I
NISN	NASA Integrated Services Network
NIST	National Institute of Standards and Technology
NM	Network Management
NMCC	Network Management Control Center
NMS	Network Management System
NPM	Network Performance Monitoring
NPSS	NASA Packet Switching System
NRT	Near Real-Time
NRZ-L	Non-Return to Zero Level
NRZ-M	Non-Return to Zero Mark
NSOC	NASDA Space Operations Center
NSS	Network System Services
NSTS	National Space Transportation System
NTM	Net to Media

NTP	Network Time Protocol
NTSC	National Television Standards Committee
N/W	Network

O

OBT	Onboard Time
OC	Operations Control
OCC	Operations Control Center
OCDB	Operational Command Database
OCR	Operations Change Request
OD	Operational Downlink
ODA	Office Document Architecture
ODF	Operations Data File
OI	Operational Instrumentation
OIU	Orbiter Interface Unit
OOS	Onboard Operating Summary
Ops	Operations
ORU	Orbital Replacement Unit
OS	Operating System
OSF	Open Software Foundation
OSI	Open System Interconnection
OSTP	Onboard Short Term Plan
OTE	Operational Test Equipment
OTR	Onboard Time Reference

P

PAP	Payload Activity Plan
PB	Playback
PC	Polynomial Coefficient
PC	Personal Computer
PCAD	Pointing Control and Aspect Determination
PCAP	Payload Crew Activity Plan
PCDB	Project Command Database
PCM	PIMS Configuration Management Pulse Code Modulation
PCTC/UDC	Payload Crew Training Complex/Utilization Development Capability
PDAC	Procedures Development and Control
PDF	Portable Document File
PDI	Payload Data Interleaver
PDL	Payload Data Library
PDRF	Playback Data Request Form
PDSS	Payload Data System Services
PFS	Primary Flight System
PI	Prime Item Principal Investigator
PID	Process Identifier
PIMS	Payload Information Management System
P/L	Payload

PM	Pressurized Module
PMA	Pressurized Mating Adapter
PMCA	Power Management and Control Application
PN	Pseudorandom Noise
POCC	Payload Operations Control Center
POD	Payload Operations Director
POIC	Payload Operations Integration Center
PP	Point Pair
PPS	Payload Planning System
PRT	Packet Routing Table
PS	Parameter Select Pressurized Section
PSCN	Program Support Communications Network
psi	pounds per square inch
PSP	Payload Signal Process
P/SS	PDSS System Support
PSS	Project System Services
PTC	Payload Training Complex
PTDB	Project Telemetry Database
PUB	Publication
PUI	Program Unique Identifier
Q	
QPSK	Quadrature Phase-Shift-Key

R

R	Range-dependent
RAM	Random Access Memory
RCS	Reaction Control System
RCU	Remote Commanding Unit
RDBMS	Relational Database Management System
RDRP	Raw Data Record Playback
ReGIS	Remote Graphics Instruction Set
REL	Released
RFI	Radio Frequency Interference
RGB	Red, Green, and Blue
RID	Review Item Discrepancy
RP	Retrieval Processor
RPM	Rounds per Minute
RPSM	Retrieval Processing Summary Message
RR	Replanning Request
R-S	Reed-Solomon
RS	Recommended Standard
RSA	Russian Space Agency
RSS	Resident Size
RT	Real-time
RT _{max}	Maximum Repair Time

RTAS	Radians to Arcsecs
RTC	RealTime Command
RTD	Radians to Degrees
RTDS	Real-time Data System
RTI	Remote Telephone Interface
RTN	Return to Normal
RTS	Requirements Tracking System
	Remote Tracking Station
RUM	Remote User Machine
RW	Reaction Wheel
S	
S	Super
S/A	Sub/Address
SA	Sub Address Single Access
S&E	Science and Engineering
SC	State Code Station Crew Subsystem Computer
SCG	Special Computation Generation
SCM	Status and Configuration Manager
SCR	Strip Chart Recorder
SDS	Scripts Database Subsystem
SDT	Shuttle Data Tape

SDV	Systems Development and Verification
SEND	KERMIT directive
SER	Scientific, Engineering, and Research Systems
SGI	Silicon Graphics Indy™ Silicon Graphics Incorporated
SGML	Standard Generalized Markup Language
SL	Spacelab
SM	Service Module System Monitor Store Manager
SMAC	System Monitor and Control
SMCM	System Monitor and Control Configuration Manager
SMTP	Simple Mail Transfer Protocol
SN	Space Network
SNMP	Simple Network Management Protocol
SOA	Science Operations Area
SOD	Shuttle Operational Downlink
SONET	Synchronous Optical Network
SOPG	Science Operation Planning Group
SPL	Scratchpad Line
SQL	Structured Query Language
SRD	Serial Receive Device
SRS	Software Requirements Specification
SS	System Services
SSA	S-band Single Access

SSAF	S-band Single Access Forward
SSAR	S-band Single Access Return
SSCC	Space Station Control Center
SSCS	Space to Space Communications System
SSCT	Send Serial Clock Timing
SSH	Secure Shell
SSGUI	Scripting Services Graphical User Interface
SSL	Secure Socket Layer
SSL3	Secure Socket Layer 3
SSME	Space Shuttle Main Engine
SSOR	Space to Space Orbiter Radio
SSS	Shared System Services
SSSR	Space to Space Station Radio
SSUP	System Services User Profile
STDN	Spaceflight Tracking and Data Network
STS	Space Transportation System
SUB	Submitted
SUT	SMAC User Team
SVF	Software Verification Facility

T

T	Typical
TAS	Test and Simulation
TBA	To Be Added

TBC	To Be Confirmed
TBD	To Be Determined
TBR	To Be Resolved
TBS	To Be Supplied
TCP/IP	Transmission Control Protocol/Internet Protocol
TDB	Telemetry Database
TDM	Time Division Multiplexer
TDRS	Tracking and Data Relay Satellite
TDRSS	Tracking and Data Relay Satellite System
TDS	Telemetry Database Subsystem
	Time Distribution System
TIFF	Tagged Image Formatted File
TLM	Telemetry
TMS	Transport Management System
TNS	Telemetry and Network Services
TNSDP	Telemetry and Network Services Distribute Packet
TPS	Telemetry Processing Services
TRW	TRW Space Park
TTL	Time To Live
TTY	Teletype

U

UAS	User Application Software
UDE	User-generated Data Element

UDLT	Universal Data Loop Transceiver
UDN	User Defined Name
UDP	User Diagram Protocol
UDSM	User Data Summary Message
UFT	Unrestricted File Transfer
UGSE	User Ground Support Equipment
UHF	Ultra High Frequency
UI	User Interface
ULC	Unpressurized Logistics Carrier
UOA	User Operations Area
UPAR	User Profile Access Routine
UPD	User Performance Data
URL	Universal Resource Locator
USGS	United States Ground Segments
USOS	United States On-Orbit Segment
UTA	User Telemetry Applications CSCI

V

VAX	Virtual Address Extension
VC	Virtual Channel
VCDU	Virtual Channel Data Unit
VCID	Virtual Channel Identifier
VMS	Virtual Memory System
VT	Video Terminal

VV	Verification and Validation
W	
WCP	Workstation Command Processor
WEX	Workstation Executive
WPL	Word Processing Language
WPSPLUS	Word Processing System PLUS
WSGT	White Sands Ground Terminal
WSC	White Sands Complex
X	
X Window	X Window System
XMODEM	The name of a file transfer protocol
XPDR	Transponder
Z	
ZOE	Zone of Exclusion

Appendix B

Glossary

Accelerator	A sequence of keys that provides immediate access to application functions. For example, Ctrl + N to invoke the New menu item.
Activation Type	Method used within local table application to activate a group. The defined methods are Time and Control.
Active Window	The workstation window that has input focus and in which keyboard entries impact and may appear. See “Input Focus.”
Analog	A mechanism in which data is represented by continuously variable physical quantities.
Application Main Window	The primary window of a software application.
Application Process Identifier (APID)	The APID is an 11-bit field that is included in Consultative Committee for Space Data Systems (CCSDS) headers. It uniquely identifies the vehicle that created the source packet.
Application Title Bar	The bar at the top of a main window that consists of the window menu button, the title area, and the minimize and maximize buttons.
Apply Pushbutton	A pushbutton that implements any changes made within its dialog box, but leaves the dialog box on the screen so that additional changes can be made. See “OK Pushbutton.”
Approve	In PIMS, this action is taken by a reviewer to signify his/her approval that a document, change request, or data request be placed in the baselined state.
Archived Database	A telemetry database that no longer reflects the current real-time telemetry characteristic information. Only one archive database is available online at a time.
Attributes Defaults Bar	The area below the menu bar on the main window where application Text: , Line: , and Fill: default attributes are set.
Avtec™	A manufacturer of telemetry transmit and receive devices used in the Huntsville Operations Support Center (HOSC) Enhanced HOSC System (EHS) as the primary telemetry processing hardware devices.
Baselined	In PIMS, the final state of the review cycle. When a document, change request, or data request has been approved by all reviewers, the approver may place it in the baselined state.

Baselined Database	Database that reflects the current real-time telemetry or command characteristic information for a particular mission activity. Baselined databases have completed validation.
Bitstream Protocol Data Unit (BPDU)	A protocol data unit of the bitstream function having a format of a header followed by a fixed length block of contiguous bitstream data.
Block	NASA Communications (NASCOM) 4800-bit block format utilized for the transfer of data via the GSFC/MSFC Multiplexer/Demultiplexer (MDM) system.
Calibrated	Three types of calibration exist for telemetry samples: polynomial, point pair interpolation, and state code conversion. If calibration is requested, Telemetry and Network Services (TNS) automatically converts the unprocessed sample and then performs calibration on the sample for that Measurement/Stimulus Identifier (MSID) as defined in the local table.
Cancel Pushbutton	A pushbutton that allows a user to exit a dialog box without implementing any changes.
Cascade Menu	A sub-menu or menu-within-a-menu that appears when you highlight a menu function that has an arrow to the right of its name. Cascade menus are used to group similar functions together beneath the pulldown menu.
Caution	A standard icon used throughout the user guide set to represent destructive actions which could result in loss of data.
Caution Limits	A range defined by a high and low value for an analog MSID in the Telemetry Database (TDB) and Local Table. A color code (yellow) represents values within those ranges in the application.
CCSDS Packet	A source packet comprised of a 6-octet, CCSDS defined primary header followed by an optional secondary header and source data which together may not exceed 65535 octets.
Channel Access Data Unit (CADU)	Protocol data unit used for transmission from the ISS to the PDSS. A CADU consists of a CVCDU that has been prefixed and delimited by a synchronization marker.
Click	The action of pressing and releasing a mouse button. Typically, this is a left mouse button action.
Coded Virtual Channel Data Unit (CVCDU)	A VCDU to which a block of error-correcting Reed Solomon (RS) check symbols has been attached.
Command System Manager	The position in charge of controlling the commanding system utilizing the Command System Management software. For AXAF projects, this is known as the PAYCOM position.

Commercial-Off-The-Shelf (COTS) Software	Software applications that have been purchased from a commercial software vendor as opposed to those that were developed internally.
Computation	A FORTRAN or C program used to manipulate telemetry parameters. These programs are created by the Computation Generation application and are executed in Computation Operation.
Configuration Management (CM) Tools	Institutional applications that allow users to access and perform tasks, such as tracking requirements and equipment, scheduling resources, and logging into automated problem report systems.
Control Indicator	Used to indicate that the group will be activated for limit/expected state (LES) sensing with either the control MSID or a control MSID plus delay time.
Control Panel	The area of a window where application pushbuttons and other graphical components are located.
Converted	The process of translating raw telemetry data into an American National Standards Institute (ANSI) standard data representation so that the sample can be properly interpreted by the machine which processes the data.
Counter-dependent	A parameter whose occurrence in telemetry is dependent on an incrementing or decrementing counter in the data.
Critical Command	A command whose initiation and execution could possibly cause damage to a payload or spacecraft and impair the mission.
Database Administrator	An individual who is primarily responsible for managing the RDBMS engine and administering database accounts. He/she also has the privilege to edit restricted database fields in any database, but is normally not recommended to edit data values that drive the telemetry and command processing for the EHS system.
Database Coordination Group	A working group which includes representatives from the appropriate project operations personnel, project source DB developers, MOL DB developers and the HOSC validation team. Review and approve/dissapprove DBCRs, resolve conflicts and evaluate any DB related issues.
Database Developer	An individual that has the privilege to edit restricted fields (e.g., decom, etc.) for both operational and non-operational databases that drive telemetry and command processing for the EHS system.
Dataset	A saved set of a command's modifiable fields used to update a command prior to being transmitted.

Data Stream Identifier (DSID)	A field within a Secondary EHS Protocol Header for PDSS Payload Data used as a unique identifier for the data stream. This bit denotes if the type of data contained therein is CCSDS packet data (0) or BPDU (1).
Delivered Database	A database must be delivered before it can become pre-released. A delivered database has not been validated for operational testing.
Delta Limit	Maximum acceptable difference between consecutive samples of a parameter.
Desktop	The computer monitor backdrop area on which all windows are opened. May also be referred to as workspace.
Development	In PIMS, the first state of the review cycle in which a document, change request or data request is still being written or is being updated.
Direction Keys	A group of computer keyboard arrow keys which allow users to move up, down, left, and right within an application or menus.
Disapprove	In PIMS, the action taken by a reviewer to signify disapproval and recommendation against moving a document, change request or data request into the baselined state.
Discrete Values	Telemetry values that have states (e.g., on or off).
Double-click	The action of pressing and releasing a mouse button twice in rapid succession.
Drag	To press and hold down a mouse button while moving the mouse on the desktop (and the pointer on the screen). Typically, dragging is used while moving and resizing windows.
Drawing Tools Palette	A group of tool buttons that is used to create graphic objects in order to display telemetry data, initiate commands, and start scripts and computations. The palette is located on its own floating dialog box or the application window.
Dump	During periods when communications with the spacecraft are unavailable, data is recorded onboard and played back during the next period when communications resume. This data, as it is being recorded onboard, is encoded with an onboard embedded time and is referred to as dump data. When a near real-time (NRT) request is written specifying that dump data is desired, the onboard embedded time is used to fulfill the request.
Dynamic Objects	Graphical objects that represent updating telemetry data.
Ellipse	A geometric shape which can be created on a display (i.e., a plane of a cone, an oval shape, etc.).
Expected State	Text state code which indicates the nominal value of a parameter.

Expert Mouse Actions	Clicks or double-clicks of mouse buttons which are non-standard and which activate special functions.
Filter	The filter function is used within a dialog box to refine and define subsets of files you want to work with using a string search and wildcard. Characters can be used to implement the filter function.
Fonts	A style of printed text characters.
Graphical User Interface (GUI)	A way of interacting with computers using graphics-oriented software and hardware.
Grayed out	A menu selection item that has been made insensitive, which is visually shown by making the menu text gray rather than black. Items that are grayed out are not currently available.
Greenwich Mean Time (GMT)	The solar time for the meridian passing through Greenwich, England. It is used as a basis for calculating time throughout most of the world. Displayed within the HOSC, it follows the format ddd:hh:mm:ss.
Grid	A pattern of horizontal and vertical lines forming squares of uniform size on a display, used as a reference for locating points.
Group Parameter Composition	Parameter composition where the bits of a parameter are contiguous and a multiple occurrence of that parameter exists as a group of samples.
Groups	MSIDs which have been grouped together, primarily for use with the Exception Monitor (EM) application.
Hazardous Command	A command whose initiation and execution could pose a threat to human life or the entire mission.
Help	A standard icon used throughout the user guide set to indicate that a cross-reference is provided to assist in solving problems or to answer questions.
Huntsville Operations Support Center (HOSC)	A facility located at the Marshall Space Flight Center (MSFC) that provides scientists and engineers the tools necessary for monitoring, commanding, and controlling various elements of space vehicle, payload, and science experiments. Support consists of real-time operations planning and analysis, inter- and intra-center ground operations coordination, facility and data system resource planning and scheduling, data systems monitor and control operations, and data flow coordination.
I-beam Insertion Bar	A graphical image used to represent the insertion point of text in a text entry area which provides a visual cue that text entry is anticipated by the system.

Icon	A graphical representation of an object on the desktop. Objects can be minimized (iconified) to clear a cluttered workspace, and restored (opened), as needed.
Input Focus	A window or window element that is activated and available for subsequent actions. Input focus is usually indicated by highlighting or changing the color of the activated element.
Input Slider	An input object that allows users to change values of pseudo parameters and computational constants assigned to objects. Pseudos can be used in other applications (i.e., scripts, computations, etc.).
Insensitive	An object or area of an application window that does not have input focus.
Integrated Support Team (IST)	Institutional groups at the HOSC responsible for configuring, monitoring, and resolving problems with computer systems and application software.
Launchpad	A floating menu bar that is used to initiate all HOSC software applications.
Legend	A table that labels parameters plotted on a chart or grid.
Limit Delta	Maximum acceptable difference between consecutive samples of a parameter.
Limit/Expected State Sensing (LES)	A configurable option in Display Operation that allows the user to select whether he wants to see limit violation status or not. The incoming data is compared against the Local Table limits.
Limits	Defined ranges for a measurement which are used to indicate off-nominal conditions: Caution High, Caution Low, Warning High, and Warning Low.
Line Plot	A plot that uses lines to represent the relationships among telemetry values.
Local Table	A subset of the TDB stored on a workstation or server used for telemetry processing.
Maximize Button	A control button that is located to the right of the application title bar. When pressed, this button enlarges the application window to its largest state.
Menu Bar	The area at the top of a window that contains the titles of pull-down menus.
Merge	The combining of data from different sources for a specific time slice. During merge, the best (cleanest) data from each source will be used to create a contiguous segment of data for the specified time slice.
Message Area	The part of the application window where system messages/responses are shown.

Message Dialog Box	An area that provides information, gives the current status of data, asks questions, issues warnings, or draws attention to errors.
Mini-Application	A secondary main window activated from within a main window application.
Minimize button	A control button located to the right of the application title bar. When pressed, it iconifies the window.
Mission, Operational Support Mode, and Project (MOP)	A MOP is what delineates one EHS activity from another. MOP information is available in the common configuration file on every node.
Mnemonic	An underlined character on a menu item, that allows users to initiate the item by typing letters on a keyboard. A user-friendly name used to reference a command residing in the command database.
Mode Independent	Mode Independent is used to describe any process that is not dependent on a data mode.
Modifiable Commands	Commands containing at least one data field which can be updated during operational activities prior to their uplink transmission.
Mouse	A pointing device that is used along with a keyboard in point-and-click user interfaces. The mouse used with HOSC workstations contains three mouse buttons. The left mouse button is used to activate and select items on windows. The middle mouse button is used for move functions. The right mouse button is used to access popup menus.
MSID Text Field	An output object for viewing telemetry containing a label for the telemetry parameter, as well as the current value of the parameter displayed in a specified format (i.e., decimal, hex, octal, binary, American Standard Code for Information Interchange (ASCII), etc.).
Multiple Drawing Mode	A mode that allows users to draw multiple objects of the same type.
Native Data Type	Defined in the database and indicates how the MSID data will be interpreted in the HOSC.
Nominal	A color code indicating expected conditions within defined limits of parameters.
Non-Shareable	A flag has been set to prevent other users from retrieving your User-generated Data Element (UDE) from the UDE Database and using it on their local workstations.
Normal	A telemetered parameter that occurs once per packet.
Note	A standard icon used throughout the user guide set to direct your attention to specific items of concern.

OK Pushbutton	A pushbutton that implements any changes specified within a dialog box. The dialog box is dismissed after this pushbutton has been selected.
Option Menu Button	A pushbutton which, when clicked, displays a menu of related options. The selected option is shown as the pushbutton label.
Output Slider	An object that displays telemetry parameters.
Packet	A data unit comprised of octets that a source application generates.
Parameter Composition	Describes how the bits of a parameter can be arranged in a packet for a sample(s) of that parameter.
Pixmap Object	A picture that can be drawn using the pixmap editor or scanned and assigned using the pixmap editor.
Playback	Playback data can originate either internally or from some other facility. Project servers in the HOSC receive Playback telemetry streams from the HOSC Data Distribution System (DDS) and perform the same processing as would be performed on real-time telemetry streams.
Pointer	Sometimes called the mouse cursor, the pointer shows the location of the mouse on the desktop. The pointer's shape depends on its mode. (e.g., on a window frame, the pointer is an arrowhead; while you are waiting for an action to complete, the pointer becomes clock).
Point Pair Calibration	A measurement which is calibrated using a series of linear segments. The linear segments are defined by a pair of points for each segment. Each point consists of a raw count value and a corresponding engineering unit value.
Pointer Shapes	A graphical shape that a pointer assumes in the drawing mode (e.g., cross-hairs, I-beams, hour-glasses, etc.).
Polynomial Coefficient Calibration	A measurement is calibrated using the following polynomial calibration equation: where: eu - engineering units cnts - counts $eu = COEF0 + (cnts1 \times COEF1) + (cnts2 \times COEF2) + (cnts3 \times COEF3) + (cnts4 \times COEF4) + (cnts5 \times COEF5) + (cnts6 \times COEF6) + (cnts7 \times COEF7) + (cnts8 \times COEF8) + (cnts9 \times COEF9).$
Popup Menu	A menu that is invoked when the right mouse button is clicked. Functions available are the most common and vary from application to application.
Predefined Commands	Commands completely defined prior to an operational activity. Predefined commands contain no modifiable data fields.

Pre-released Database	A database that has been validated for operational testing. It is used to validate UDEs (displays, comps, etc.) prior to the baseline release of the database.
Project Telemetry Database	Contained within the Telemetry Database, includes the telemetry definitions needed to drive HOSC telemetry processing for a specific project/mission. The source of the real-time telemetry processing tables found in the Telemetry Local Table identified by a project/mission/revision prefix. Also included are tables to contain user copy data, an error log, and an Initial Load Table.
Protocol	1: Provides the formulas for passing messages, specifies the details of message formats, and describes how to handle error conditions. More importantly, it allows us to discuss communication standards independent of any particular vendor's network hardware. A communication protocol allows one to specify or understand data communication without depending on detailed knowledge of a particular vendor's network hardware. 2: A term referring to the type of source data used in the construction of an EHS packet. EHS Packet Protocols include: "C" - CCSDS packet, "P" - pseudotelemetry packet, "T" - encapsulated TDM packet, "B" - encapsulated block packet, and "D" - TDS packets.
Pseudo MSID/Parameter	A parameter identification (ID) that has been assigned to contain the output from a computation.
Pseudo Packet	A telemetry packet consisting of external pseudo MSIDs. External pseudo MSIDs are generated (either by EHS computations or scripts), packetized and multicast on the project LAN.
Pulldown Menu	A list or menu of possible options that is hidden under a general phrase and invoked by clicking the left mouse button.
Pushbutton	A control that causes an immediate action. To press a pushbutton on the screen, point to it and click the left mouse button.
Radiobuttons	A group of buttons that allows users to make only one selection at a time. Radiobuttons are small diamond-shaped buttons.
Range-dependent	A parameter whose occurrence in telemetry is dependent on the value of a range parameter.
Real-time Data	Real-time data is telemetered to the HOSC and distributed for immediate use. Real-time telemetry data, received into the HOSC system and written to the NRT log, is indexed by its time stamps and other identifying information. When an NRT request is submitted that covers a particular time slice, this indexing information is used to meet that request.

Recall Text	Area within an application that allows users to input up to 256 characters.
Release	In PIMS, an action taken by the manager of a document or request that releases it from the baselined state back into the development state for modifications.
Resize Borders	The area that surrounds the framed area of an application, and is used to change the height or width of the window.
Resize Handles	Up to eight handles surrounding an object that allows users to resize objects, displays, or windows.
Review	In PIMS, the second state of the review cycle in which the document, change request or data request has been written and submitted for review and approval.
Sample Composition	Describes how the samples of a parameter are arranged in a major frame.
Scatter Plot	A plot that uses unconnected dots to represent the relationships among telemetry values.
Scratchpad Line (SPL) Directives	Provides users with the capability to start and stop displays, computations, and scripts. A user may also uplink and modify commands and update pseudo MSIDs through the use of SPL directives.
Script	A file containing a sequence of directives that can be invoked in a single step.
Scroll Bar	A control that allows the contents of a window area to be displayed without resizing a window or list.
Select Button	The mouse button used for most operations. By default the select button is the left mouse button.
Set Pushbutton	A pushbutton that allows a user to implement changes based on selections made within a dialog box. Reacts like the OK pushbutton and closes the dialog box.
Setup Message Area	The dialog box that allows users to change the number of lines displayed within the message area of the application main window.
Shareable	A flag has been set to allow other users to retrieve your UDE from the UDE Database and use it on their local workstation.
Shotgun	Parameter composition when the bits of a parameter are scattered in multiple non-contiguous words of a major frame.
Slider Box	A graphical component of the scroll bar, which is dragged to provide a different view of the same file, list, or text area.
State Code Calibration	A measurement is converted to a text state code.
Static Object	A graphical object that is not receiving telemetry data.
Status Bar	A feature that allows the viewing of application critical configurations within the main window.

Submit	In PIMS, an action taken by the manager of a document, change request, or data request in which the document or request is placed in a state of review and approval and released from development.
Subset	A collection of measurements from the total measurement set that is bounded as an integer number of octets but does not constitute the packet itself. A mini-packet.
Super	A parameter that occurs more than once per packet.
Superseded Database	If a baselined database already exists for a project and mission, before a new baselined database can be released, the current baselined database is designated as superseded.
Switch MSID	A parameter whose value determines which limit or calibration set will be used for the specified MSID.
TDM	Time Division Multiplexed - a technique for transmitting multiple parameters within a single serial bit stream by interleaving them, one after the other.
Time Indicator	Indicates that a group will be activated based on a defined start time and deactivated based on a defined stop time.
Time Plot	A plot against time containing up to four Y-Axis parameters.
Time Reference	A time format that is represented in either GMT or Mission Elapsed Time (MET).
Time Tag	A time reference marking an event. For example, a parameter goes out-of-limits at 230:16:00:00. The time tag for the out-of-limit event is 230:16:00:00.
Tip	A standard icon used within the HOSC user guide set to indicate that suggestions or hints are provided.
Togglebuttons	Small buttons that can be switched "on" or "off." To switch a togglebutton, point to it and click the select button. Black indicates that the desired attribute is in effect or "on."
Tolerance	Number of times the MSID exceeds the limit value before an EM warning message is issued.
Typical	Parameter composition when the bits of a parameter are contiguous.
Unprocessed	Raw telemetry data.
User-generated Data Element (UDE)	A user-generated file. For example, a display, script, computation, pixmap, etc., is a UDE.
User Data Summary Message (UDSM)	A PDSS Data Quality packet. Information contained in the packet includes: the start/stop time of the UDSM report period, the number of unplanned LOS occurrences, the number of BPDUs or packets per DSID received, the number of VCDU sequence counter errors, and the number of packet sequence counter errors per DSID.

Virtual Channel (VC)	A CCSDS construct whereby a physical communications channel is shared among different users, each of whom uses part of the available bandwidth for a virtual channel of CCSDS CADUs incorporating predetermined CCSDS identifiers for each user.
Virtual Channel Identifier (VCID)	A binary identifier located within the VCDU header, which when concatenated with the spacecraft identifier, uniquely identifies a particular spacecraft virtual channel.
Virtual Channel Data Unit (VCDU)	A CCSDS data set of specific structure and fixed length, which includes CCSDS specified headers and into which user data is packaged for transmission over the space-to-ground link.
Warning Limits	A color code (red) representing limit violations of a parameter.
Wildcard	Placeholders for other characters in a string. Three wildcards are permitted in most HOSC applications. The “*” represents any combination of characters and the “?” represents any single character. A blank can be used to replace a single “*” to indicate “all”. Database applications use Oracle as their basis; therefore, “%” is used like the “*” and an underscore character “_” is used like the “?”. Blank operates the same way in database applications as in other HOSC applications and represents “all.”
Window Menu	The menu that appears when you press the window menu button, which is located to the left of the application title bar on a window frame. Every window has a system menu that enables you to control the position of the window.
Workspace	The area on a terminal where the windows of a user’s environment appear. The workspace is sometimes referred to as a desktop or root window.
XY Plot	A plot that contains one X-Axis and up to four Y- Axes parameters.